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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

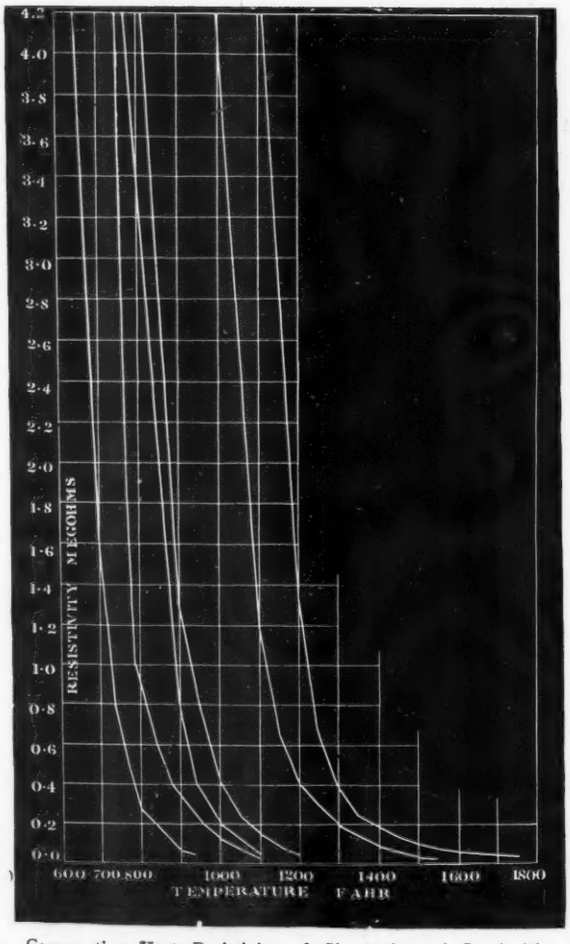
Vol. XLII
Number 7

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, FEBRUARY 12, 1920

Twenty cents a copy
Three dollars a year

CHAMPION TRADEMARK

Champion Dependable Spark Plugs



Comparative Heat Resistivity of Six Makes of Spark Plugs. Note that Champion Spark Plugs (on the right) remain non-conducting beyond the highest known engine heat.

Unharmed by Heat

A LIBERAL Factor of Safety insures Champion Spark Plugs against the effects of extreme engine temperatures.

The results indicated on the accompanying chart prove that the famous Champion "3450" Insulator is an absolute non-conductor at temperatures which destroy the insulating properties of the best previous spark plug insulator.

Champion maximum heat resistivity is compelling the attention of leading automotive engineers. The Factor of Safety in the "3450" Insulator eliminates spark plug troubles, which otherwise often cause owner-dissatisfaction with parts of the car that are not at fault.

Champion now makes possible in spark plugs the same Factor of Safety with which frame, axle and other car units are designed.

Champion Spark Plug Co., Toledo, Ohio
Champion Spark Plug Co., of Canada, Ltd., Windsor, Ont.

Entered as second-class matter Jan. 3, 1903, at the Post Office at New York, N. Y., under the Act of March 3, 1879

77777

columns of advertising were printed by *The* CHICAGO TRIBUNE *in* 1919

It was subdivided as follows:

	Advertising Printed in Columns	Gain Over 1918	Lead Over Next Paper
Local Display - - - - -	**32371.10**	**57.6%**	**18.4%**
National Display - - -	**16297.54**	**85.2%**	**110.4%**
Classified - - - - - - -	**29108.64**	**29.1%**	**55 %**
Total	**77777.28**	**50 %**	**45.6%**

DURING the year 1920 The Chicago Tribune Newspapers, comprising The Chicago Tribune, The New York News, and The European Edition of The Chicago Tribune (published in Paris), will issue more than two hundred and five million (205,000,000) copies based on present circulations.

The Chicago Tribune recently subscribed to a foreign Newspaper clipping service to learn to what extent it is being quoted abroad. Hundreds of clippings are being received daily showing that The Chicago Tribune Newspapers are a powerful international influence for Americanism.

A news report that is the marvel of journalists, service to readers that brings hundreds of thousands of letters from them, service to advertisers that *insures* success, and a tremendous volume of circulation in the most desirable market on earth have established in its unique position.

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THE WORLD'S GREATEST NEWSPAPER

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LOS ANGELES

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLII NEW YORK—THURSDAY, FEBRUARY 12, 1920 No. 7

British Moulders Resume Work After Disastrous Strike

The settlement of this long strike, which has seriously curtailed automobile production in England and the effects of which, it is predicted, will be felt for years, is announced here by Mr. Northcott in two articles written at different times

By Charles H. Northcott

LONDON, Jan. 25.

AFTER several more weeks of uncertainty and negotiation the iron moulders and foundrymen have returned to work. The terms reached at the negotiations early in January and reported herewith were rejected by ballot of the members on Jan. 8, with 9631 votes in favor of acceptance, and 16,718 against. Such a motor center as Coventry is said to have voted overwhelmingly for resumption of work, while Sheffield and Derby were equally emphatic. Other districts, however, were quite as strongly against acceptance.

The defeat of the ballot raised several questions. Were the men merely obstinate or had they some long-standing grievances which must be settled before they would resume work? They were obviously beaten, since their own union funds were exhausted and they were receiving only a miserable pittance of 14s. per week from funds borrowed or collected.

The answer to these questions came within a few days of the rejection of the terms. The Rugby joint strike committee circularized all strike centers, suggesting a new ballot on the question of resuming work on the employers' offer, provided that an inquiry was made into the working conditions in foundries and into the profits of the industry. The moulders claimed that their work was different from other sections of the metal trades. It was arduous, dirty, dangerous, hot, unhealthy and highly skilled. It had a higher percentage of sickness and accidents than other trades and was held to be deserving of special consideration.

This proposal for an inquiry was put before the employers who declined a Sankey commission in the metal trades. They agreed, however, on the resumption of work by the moulders, to meet their executives and discuss the working conditions in foundries. This was accepted by the labor leaders, and the full terms were submitted to ballot of the members. These terms were:

(a) An advance of 5s. a week in wages.

(b) Future wage adjustments to be determined by some method of avoiding disputes mutually determined.

(c) Work to be resumed, so far as practicable, by Jan. 26, without victimization on either side.

(d) A joint conference to be held early in February to discuss working conditions in the industry, hours and district standard minimum rates.

These were accepted, 17,667 voting in favor, and 11,263 against.

The majority against acceptance of such favorable terms suggests the strength of the contention of the Rugby joint strike committee. *The Times* in an editorial declares that the men "were in revolt against the conditions in which, generally speaking, they were forced to work. The ironfounding industry in this country has grown up in a haphazard way; many of the buildings in which it is carried on are unsuitable, judged by modern standards."

If the strike leads British iron founders to make reasonable alterations in the conditions of the industry, this may prove to be a real recompense for a strike that on every other ground was a blunder and a tragedy.

LONDON, Jan. 7—At length, after fifteen weeks of idleness, the effects of which have been felt in every engineering establishment in the United Kingdom, terms have been arranged whereby the iron moulders' strike may be regarded as at an end. Fifty thousand skilled workers have been involved, while at least another 50,000 men have been indirectly thrown into unemployment. For many weeks every branch of the engineering and shipbuilding trade has been going slow. Contracts have been lost to employers and the country. Engines, wagons, automobiles and ships—every form of transport and every type of machine—have been held up.

The strike was a flagrant example of the breach of a national agreement. In February, 1917, the engineering and shipbuilding employers of this country entered into a national wages agreement with 51 trade unions connected with the industry, providing for the adjustment of wages during the war. Every four months, in February, June and October of each year, employers and workers would mutually approach the Committee on Production, the arbitration court set up by the Government, to ascertain what alteration in wages was just and equitable under the wartime conditions prevailing. This standardized and orderly method of adjusting wages was imitated in other industries, and was carried on under changing forms of arbitration tribunals. In June, 1919, the Interim Court of Arbitration held the periodic hearing. On this occasion the employees asked for an advance of 15s. per week; the employers made a counter-claim for a reduction of 5s. a week, in view of the fall in the cost of living. The court on July 15 decided that no general change in the rate of wages was called for under the circumstances and that wages should remain unaltered.

Three Unions Demur

This decision was accepted by all but three of the unions. The three which declined to accept it were the iron founders, core-makers, and the iron, steel and metal dressers. Early in August they approached the employers direct with a demand for the 15s. increase which the Court of Arbitration had denied. The employers referred then to their agreement to seek wage adjustments only through the court. The moulders thereupon gave three weeks' notice of their intention to withdraw from the agreement, and to strike a week later if the employers would not grant their demands. The latter declined to consider the application for a further advance, since in October the court would again hear the engineering unions' request for an advance of 15s. But the moulders were obdurate. Efforts at mediation failed to settle the points at issue, and on September 20 50,000 iron moulders went out on strike.

The men met with little sympathy. Only a few weeks before, at the Trade Union Congress in Glasgow, the retiring President had protested against the repudiation of agreements as "impairing public confidence in the integrity and honor of trade unionists." Nevertheless, despite the obvious lack of sympathy with the strikers, a strike among iron moulders was so serious in its effects upon the whole of the metal trades that a joint conference between employers and representatives of the workers was held in London October 12. This conference drew up a draft agreement which was to be submitted to ballot of the members, and would have provided for a return to work on October 20. But this agreement was rejected by the members with a majority of 16 to one. After this, the general opinion was that these men must be "left to stew in their own juice."

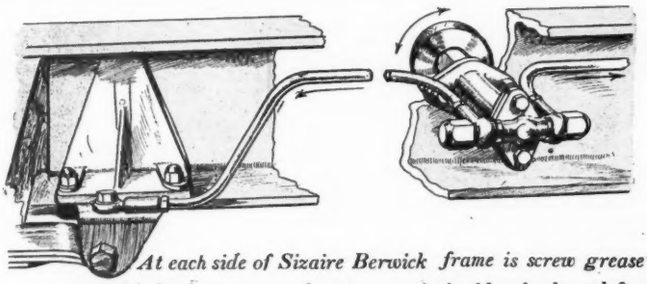
The Settlement

At the end of October, however, the periodical arbitration concerning wages in the engineering and ship-building trades, at which an advance of 15s. per week was asked for, resulted in an award of 5s. This award formed a basis for the settlement of the iron moulders' strike, if the moulders could be reasonable. But the men had exasperated their employers, who rightly asked for resumption of work before negotiation. This condition, however, they were compelled to waive, but the discussions dragged on slowly and a few days before Christmas broke down. This time the employers, anxious to obtain a complete resumption of work, insisted that certain moulders, involved in a local dispute where rivalry between a skilled and an unskilled union was the matter at issue, should return to work along with their fellows. The unions resented this as an attempt to humiliate them by forcing them to yield to the pretensions of an unskilled union in order to secure the major advantage of a national settlement of the deadlock. By the strategy of the Prime Minister, the minor issue was removed, and delegated for settlement to the Committee of the Trade Union Congress. A joint conference between the parties produced an agreement to be referred to the men. This included an advance of 5s. per week from the resumption of work, which was to take place by January 19. No victimization was to take place on either side, and future general alterations in wages were to be adjusted by mutually agreed provisions for avoiding disputes.

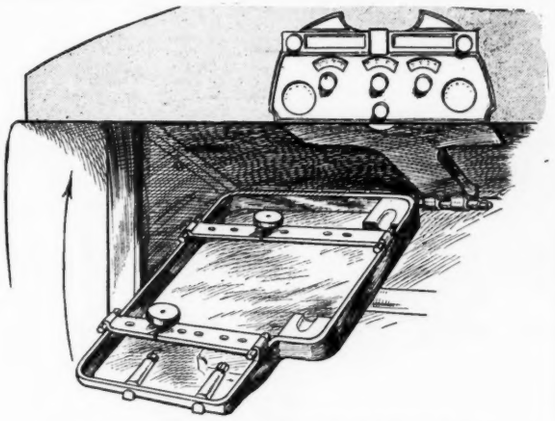
The removal of this deadlock will allow industry to breathe freely. No single event or action during the year 1919 so seriously delayed industrial reconstruction in Great Britain as this ill-omened strike. Its effects have not been so noticeable as a dispute among the transport unions, but have really been more serious. Industries like the automobile, that depend largely upon castings, have been completely tied up. England is desperately short of railway wagons and her railroad transportation is so congested that trade and commerce are badly hit.

This breach is *not* evidence of a general inclination on the part of trade unions to break an agreement that has ceased to give them an advantage. British trade unions and British trade unionists do break agreements; war time experience affords many instances. But war conditions had produced a revolt from the authority of trade union leaders. The "rank and file" movement was a form of rebellion against men who, in view of the national danger, had pledged themselves to abstain from strikes. When, therefore, local bodies of men struck against what they deemed injustice, they necessarily struck against agreements entered into by their leaders. The charge of breaking agreements was, therefore, implicit in the situation. But the chief weight of trade union opinion was, and still is, thrown against breaches of agreements. It is recognized that only by loyalty to its pledged word can the trade union movement justify itself before a critical and often hostile public. On the whole, it has succeeded in keeping its word. Evidence to this effect is forthcoming from those who know best how often and under what provocation agreements have been kept.

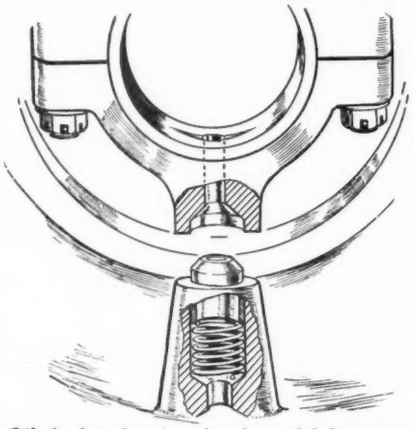
Mechanical Features of British Cars



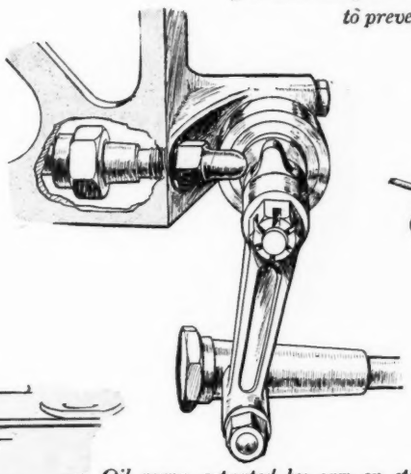
At each side of Sizaire Berwick frame is screw grease pump with leads to spring bearings and shackles, back and front. Knurled head of screw plunger is accessible outside of frame

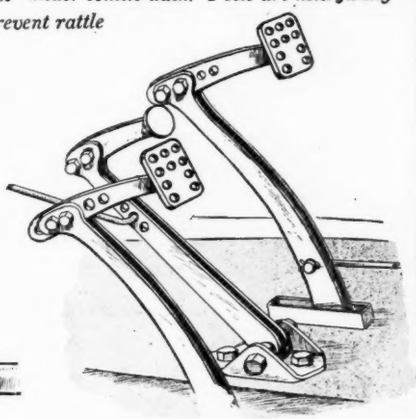


Sizaire Berwick has hinged aluminum tray for tools and jack under scuttle dash. Tools are held firmly to prevent rattle

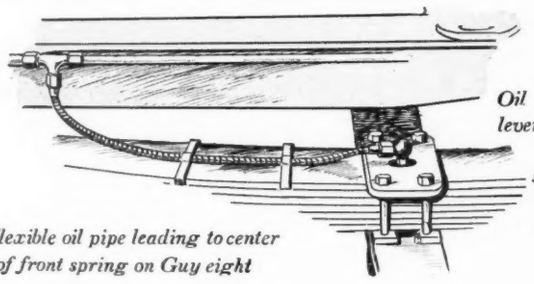


Oil feed to bearing housing of hollow crankshaft in A C light six Oil ways and towers with spring backed plungers are cast with aluminum pump



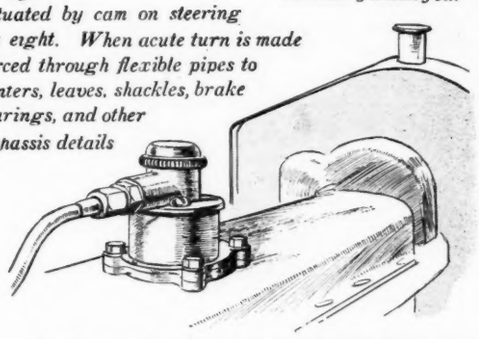


Pressed steel pedals on Humber fifteen four

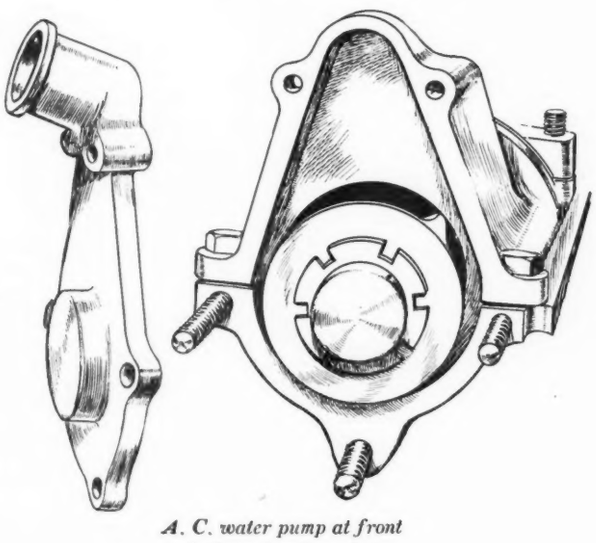


Flexible oil pipe leading to center of front spring on Guy eight

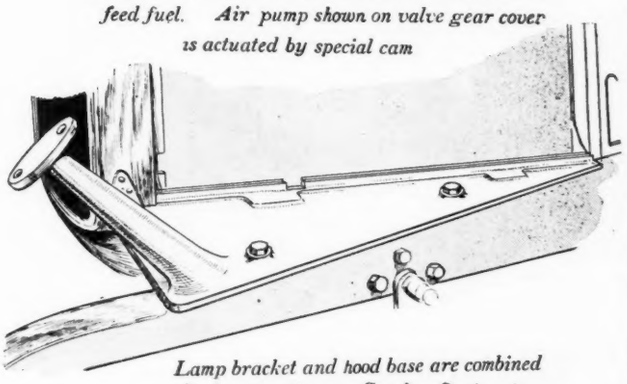
Oil pump actuated by cam on steering lever of Guy eight. When acute turn is made oil is forced through flexible pipes to spring centers, leaves, shackles, brake lever bearings, and other similar chassis details



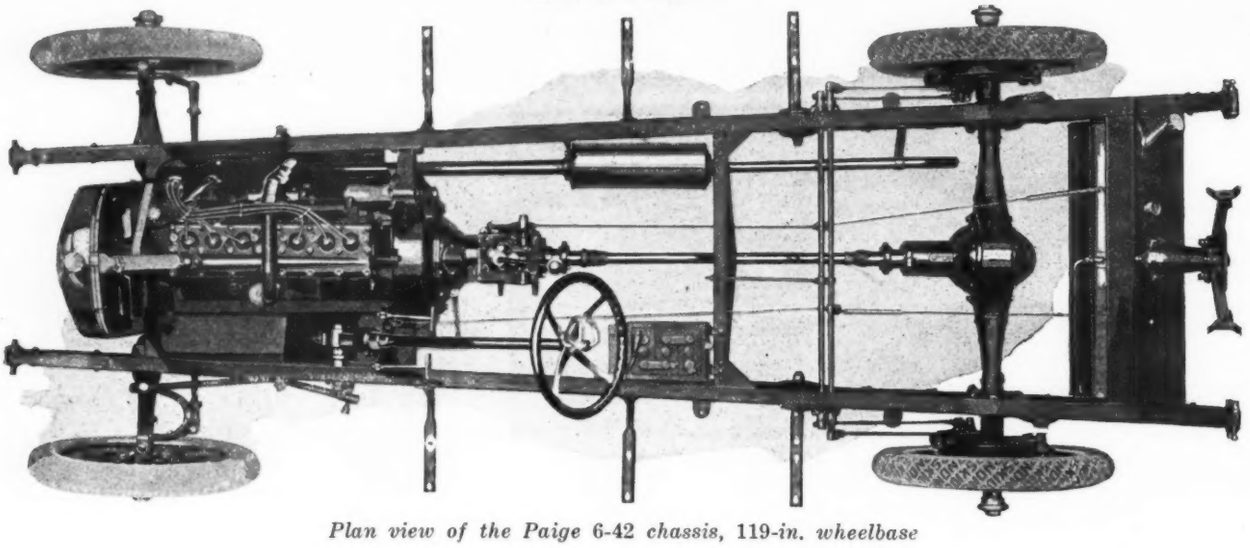
Napier overhead camshaft six cylinder has pressure feed fuel. Air pump shown on valve gear cover is actuated by special cam



A. C. water pump at front end of overhead camshaft



Lamp bracket and hood base are combined aluminum casting on Straker Squire six



Plan view of the Paige 6-42 chassis, 119-in. wheelbase

Paige Enters 1920 with New Six Cylinder Design

A light six, planned for high performance, was first exhibited by the Paige company at the New York show. The feature of greatest interest in this partially assembled car is the L-head engine of 231 cu. in. displacement.

By J. Edward Schipper

A NEW Paige Six was exhibited at the New York show for the first time. It is a car of 119 in. wheelbase and incorporates an entirely new engine designed and built in the Paige factory. The Six-55, mounted on a chassis of 127-in. wheelbase, will be continued. The Six-42 has been designed as a light weight, 6-cylinder, high performance car and will be provided with a full range of bodies. It differs materially from the larger Six-55, being a new product throughout. The chassis frame and drive members are of different construction altogether than the present Paige, and, the wheelbase being shorter, the propeller shaft is a single unit.

The engine and transmission are manufactured in the Paige plant while the majority of the other parts are secured from well-known parts makers. These include a Borg & Beck clutch, Universal-Detroit propeller shaft, Salisbury front and rear axles, Kelsey wheels, Jacox steering gear, National Can radiator, Gray & Davis starting and lighting equipment and Atwater-Kent ignition.

Of particular interest is the 3⅛x5-in. 6-cylinder engine of 231 cu. in. piston displacement, with a speed range of 200 to 2800 r.p.m. It incorporates many up-to-date ideas in L-head construction. The compression ratio is about 5 to 1, or 20.37 per cent of the total volume. The weight of the engine less the fan, carbureter and the electrical equipment, is 644 lb. Including the above equipment, it weighs 702 lb., and including the clutch and gearset, 816 lb.

Following what seems coming to be universal practice, the cast-iron cylinder block is in a unit with the upper half of the crankcase. The head is separate and the bottom pan contains the oiling system. The part of the crankcase that is integral with the cylinders is carried 1 13/16 in. below the center of the crankshaft—for stiffness—and has a milled slot to take the main bearing caps. The engine is a three-bearing type.

To distribute evenly the load over the cylinder head, it is secured by 22 studs of 7/16 in. diameter and so designed as to allow for free water circulation around the valves and cylinders. Particular care has been taken in laying out the water channels to eliminate the possibility of steam pockets. One particular point that will be appreciated by garage and service departments is that lugs are cast opposite cylinders Nos. 1 and 6 so that a screwdriver or cold chisel may be used for prying the head loose without causing injury to the cylinder head gasket. The frequency with which heads are frozen to the cylinder makes this a valuable point in repair work.

The carbureter is secured to the left side of the engine and the mixture carried across by means of a 1¼ in. diameter cylindrical cored passage between cylinders Nos. 3 and 4 to the combination exhaust and intake manifold located on the right side. The fore and aft intake passage is located above the exhaust so that the bottom of the intake, where the heaviest fuel accumulates, is exposed to the greatest heat. This tends to warm quickly the engine when starting cold, and for proper carburetion of present low grades of fuel. The intake passage is cylindrical over its entire length.

Practically a double manifold is used for the exhaust with a common exit at the center of the engine, each half of the manifold taking care of three cylinders. A modified ejector action is attained in the manifold by the firing order, which is 1, 5, 3, 6, 2, 4, alternate explosions at opposite ends of the manifold providing this action.

Pistons and Pins

The crowned grey iron pistons are fitted with three rings, two of which are above the piston pin and one below. The piston pin is hollow, of 1 in. outside diameter, hardened and ground and fastened in one boss of the piston with a cyanided set screw. The weight of one bare piston is 22 oz., and the weight of the piston, including the pin, set-screw and rings, is 28¾ oz. The bottom edge of the bottom piston ring groove is beveled and ventilated with eight ⅛ in. holes to avoid oil pumping, and, in addition, there are seven ⅛ in. holes drilled in the bottom of the ring groove. The lower edges of the piston rings are cut with a recess that scrapes the excess oil from the cylinder walls and at the end of the down stroke expels this excess oil from the cylinder bore. The rings are of Wasson manufacture and are of the peened concentric type. In manufacture, a special Toledo scale is used to weight the pressure necessary to close the ring to the proper diameter. This is held at from 8 to 10 lb. A running clearance of 0.002 to 0.003 in. is provided at the bottom of the pistons and 0.013 in. to 0.015 in. at the top.

The connecting rods are drop forged from 0.35 to 0.45 carbon steel and are 10½ in. center to center. The forgings are heat treated to give a tensile strength of 110,000 lb. per sq. in. and an elastic limit of 75,000 lb. per sq. in. The scleroscope hardness of the bosses is 34 to 42, and of the I-section, 45 to 50. The upper end is bushed with No. 43 S. A. E. bronze, the lower end with No. 24 S. A. E. die-cast babbitt. Adjustments on the lower end of the rod are taken care of by laminated shims, graded 0.002 in. thick. Two heat treated connecting rod bolts of 7/16 in. diameter are used for each cap. These bolts are of nickel steel and secured with castle nuts and cotter pins. The piston end of the connecting rod is drilled to intercept an annular groove turned on the outside of the piston pin bushing. Four holes, equally spaced, are drilled into this annular groove and meet four oil grooves on the inner surface of the piston pin bushing, which distribute oil over this bearing. The weight of the connecting rod assembly is 2 lb. 15 oz. and the rods in any engine are held within ¼ oz. of the same weight.

The Crankshaft

The three-bearing crankshaft is drop forged from 0.45 to 0.55 carbon steel and is heat-treated to a tensile strength of 127,940 lb. per sq. in. (an average of twenty-three tests.) The elastic limit is 80,791 lb. per sq. in. The weight of the finished shaft is 69 lb. It has a diameter of 2⅛ in. on the crankpin and of 2.115, 2.125 and 2.135 in. on the three main bearings, front and rear, respectively, giving a shaft of exceptional stiffness. End play is taken care of at the front main bearing by a 3¼ in. flange on the front surface of the first web and the rear surface of the hardened gear which drives the camgear. Each of these surfaces is polished and bears against a flange on the front main bearing. End play adjustment is made by means of shims, 0.004 in. thick, placed between the gear and a shoulder on the crankshaft. A clearance of 0.005 in. is desired for end play. The main bearings are S. A. E. No. 24 babbitt.

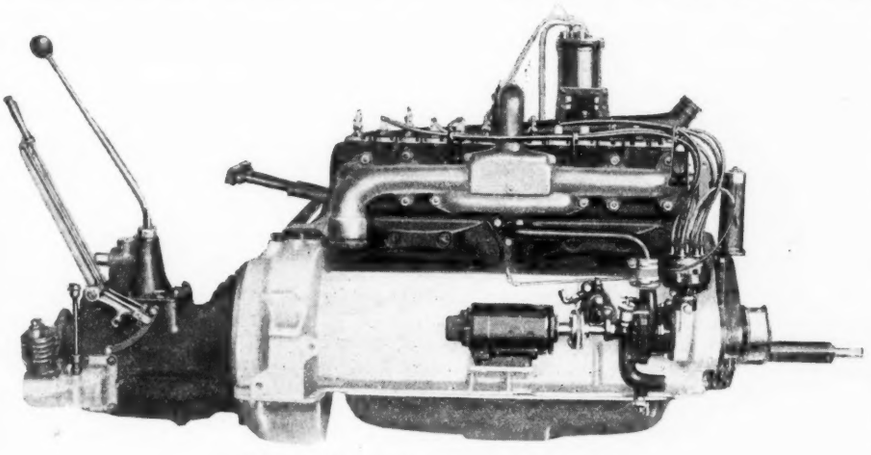
The 1 in. camshaft is driven by a Fabroil gear mounted on a 4 in. flange at the front end. The ¾ in. cams are integral, the intake having a lift of 0.3125 in. and the exhaust 0.317. The cams are offset from the center of the mushroom valve lifters, causing the latter to rotate, thus distributing the wear. The shaft is carried on three bearings and at the center of the center cam bearing is an eccentric having a stroke of 5/16 in. that is used for operating the plunger oil pump. All of the camshaft bushings are die cast from S. A. E. No. 24 babbitt. The front cam bearing is prevented from rotating by means of a 3/16 in. brass dowel, which is pressed into the cylinder and engages a slot in the flange of the bushing. At the front end, the camshaft is bored out to receive a coiled spring and a hardened and polished thrust button, which bears against a hardened and polished shoulder pin in the timing gear cover to fix the location of the camshaft.

Two Valve Types

Two types of valves are being employed, the difference between them being that one type has cast-iron heads and the other nickel steel heads. The valve stems in each case are of carbon steel, the bottom ends being machined to a radius and hardened and polished. The diameter of the valve port is 1 7/16 in., while the greatest diameter of the valve head is 1 9/16 in. The angle of the valve seat is 45 deg., and the weight of the valve is 4½ oz. The valve stems operate in 4⅛ in. cast-iron guides pressed into the cylinders. The springs are of ⅞ in. inside diameter and 2¼ in. long. When closed they exert a pressure of 45 to 50 lb. that increases to 68 lb. when the valve is wide open. The clearance provided between the head of the adjusting screw and the valve stem is 0.003 in.

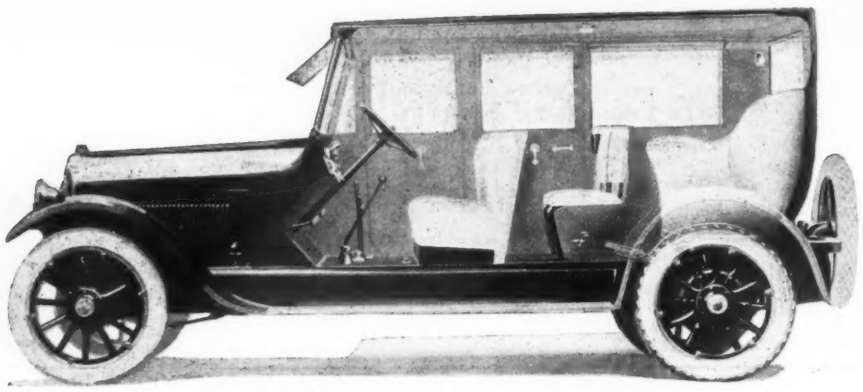
By removing the three screws retaining the valve spring covers, the valve lifter brackets are easily removed. There are two of these brackets that are secured to the cylinder by means of four cap screws and two headed dowels each. The valve timing is as follows:

Intake opens 15 deg. past top dead center.
Intake closes 50 deg. past bottom dead center.
Exhaust opens 45 deg. before bottom dead center.
Exhaust closes 10 deg. past top dead center.



Right side of the Paige 6-55 engine

Lubrication is by combined force feed and splash, giving a consumption of one gallon to between 400 and 700 miles. The oil is forced under pressure to each main bearing by means of a plunger pump operated by the eccentric described. The pump is bolted to the bottom face of the cylinder by three screws and is operated by a



Phantom view of the Paige 6-55, 7 passenger

plunger of steel tubing. A ⅜ in. tube carries the oil from the pump to a 5/16 in. diameter tube on the left side of the engine. Branches of these tubes extend to each main bearing cap. At cylinders Nos. 2 and 5 a 0.042 in. hole is drilled into the tube which delivers oil to the troughs under the connecting rods at these cylinders. The oil which enters the main bearing is distributed over the bearing surface through grooves 3/16 in. wide and 3/64 in. deep. The oil enters each bearing through a ⅛ in. hole, and at the end of the groove is located a 3/32 in. diameter hole to provide an outlet for the oil. The object of such construction is to carry the heat away from the bearing and to remove any foreign substance that may have been washed into the bearing through the pump. After passing through the front main bearing, the oil enters the timing gear cover, maintaining a sufficient level to insure the crankgear dipping. The level is maintained by a dam, over which the oil flows into No. 1 trough. The excess oil from the center main bearing drains into No. 3 and No. 4 troughs and from the rear main bearing into No. 6 trough. The connecting rods have a normal dip of ⅛ in.

On the right side of the engine, troughs connect dipper troughs Nos. 1 and 3 and another trough connects Nos. 4 and 6 for distribution purposes. The oil level is indicated by a float level gage. Pressure is prevented from becoming too great by an oil pressure regulator built as part of the oil pump body. It consists of a ⅜ in. diameter steel ball held against its seat by a ⅜ in. spring with a pressure of 1 lb. When the pressure on the oil line exceeds 3 lb. per sq. in. the ball is forced from its seat, allowing the excess oil to empty into the lower oil pan. An oil pressure gage registering up to 8 lb. is mounted on the dash.

Starting and Lighting

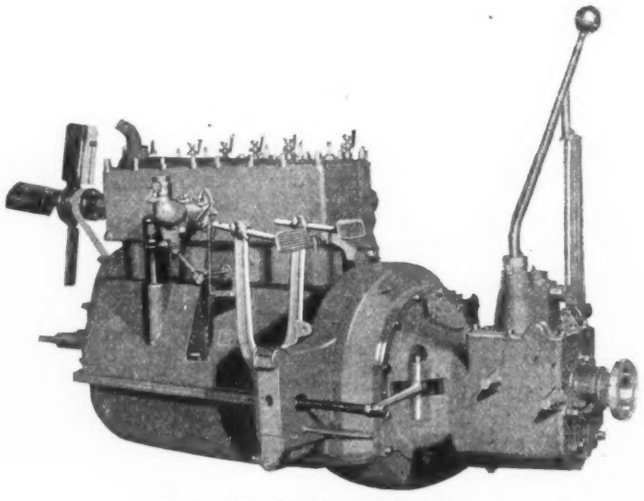
The Gray & Davis starting motor weighs 19½ lb. It is furnished with a Bendix drive. The pinion carries 11 teeth and the flywheel 130 teeth, giving a reduction of 11.818 to 1. The starting motor is located on the forward right side of the flywheel housing 2 in. above the center of the crankshaft. The generator rotates at 1½ times crankshaft speed and starts charging at 7 m.p.h., or 500 r.p.m. of the armature shaft. At 14 m.p.h. the generator should charge at from 12 to 14 amp. and it can hold this rate up to a speed of about 35 m.p.h. The storage battery is the 111 amp. hr. Willard type, six volts. The ignition is the Atwater-Kent automatic advance type, the distributer being located on the right side of the engine near the front end and driven by a five-tooth, 20-pitch, spiral gear on the water pump shaft. The ignition drive is an integral part of the engine design that is automatically lubricated by the timing gears. The spark plugs are of the A-C type, ⅞ in. thread.

The flywheel housing is a 48-lb. iron casting secured to the rear end of the cylinder by five ½-in. bolts. This housing also serves as a bracket for the brake and clutch pedal mountings, and for the clutch, which is a 10-in. Borg & Beck dry plate, type DX. The gearset is bolted directly to the flywheel housing with ten ⅜-in. cap screws, forming the unit powerplant. It is a selective type having three forward speeds and one reverse, the third speed being a direct drive through a four-jaw clutch. The gear reductions in the box are 2.925 to 1, 1.6363 to 1 and reverse 3.9 to 1. All the gears are 6-8 pitch, stub tooth, 20 deg. pressure angle, and ⅞-in. face, except the counter-shaft drive gear, which is ¾-in. face, and the main drive gear, which is 1 1/16-in. face. A neutral clearance of 3/16 in. is provided and the gear teeth are chamfered to assist in shifting. The center to center distance of the two shafts is 3½-in. The main drive gear is carried on annular ball bearings at the rear end and on a Hyatt roller at the forward end. The main shaft is carried on an annular ball bearing at its rear end and a Hyatt bearing at the front end and the countershaft on the Hyatt bearing at each end.

Lock on Transmission

The main drive gear and the spline shaft bearings are carried directly in the case and are clamped against a shoulder by their outer races. The gearset is provided with a lock which prevents the engagement of the hand lever with either of the gear shifters, thus locking the gearset in neutral. When the tube is moved to the locking position a Yale cylinder automatically locks it in place, and the key only is necessary for unlocking. The Yale lock has 250 different combinations or key changes and cannot be picked.

Hotchkiss drive is employed. Both sets of brakes are on the rear wheels. The frame is of the pressed steel type with gusseted cross-members, with a 17-gal. gasoline tank mounted across the rear. It is of straight taper construction. The springs are semi-elliptic all around, the rear springs being 61¼ in. in length. The body is of the straight line, moulded type, with a modified center cowl. It carries a four-bow top, sloping windshield and a cowl which is in a straight line with the top of the hood in accordance with present practice.



Left side of Paige 6-42 engine

The Lorraine-Dietrich Production of Airplane Engines

The changing demands of the World War called for a constantly developing program by this French company, the work being headed by Engineer Barbarou. The Liberty engine was partially based upon Lorraine-Dietrich models.

By W. F. Bradley

A DESCRIPTION of the various aviation engines built in the Lorraine-Dietrich factories would constitute a reliable history of airplane engine development in France during the war. The firm started in at the beginning and developed and put into production each type of engine as it was called for by the requirements of the war. It was a constantly developing program calling for both experimental work and quantity production. The Lorraine-Dietrich engineers did all the former, including a considerable amount of carbureter and intake manifold work on the Liberty engine, but were assisted in quantity production by several outside firms.

In 1914, when the serious shortage of reliable aviation engines had been felt in France, Engineer Barbarou was attracted to the problem both as an engineer and as a qualified airplane pilot. He was undoubtedly the only automobile engineer in France who for a long time had flown and maintained his own airplane.

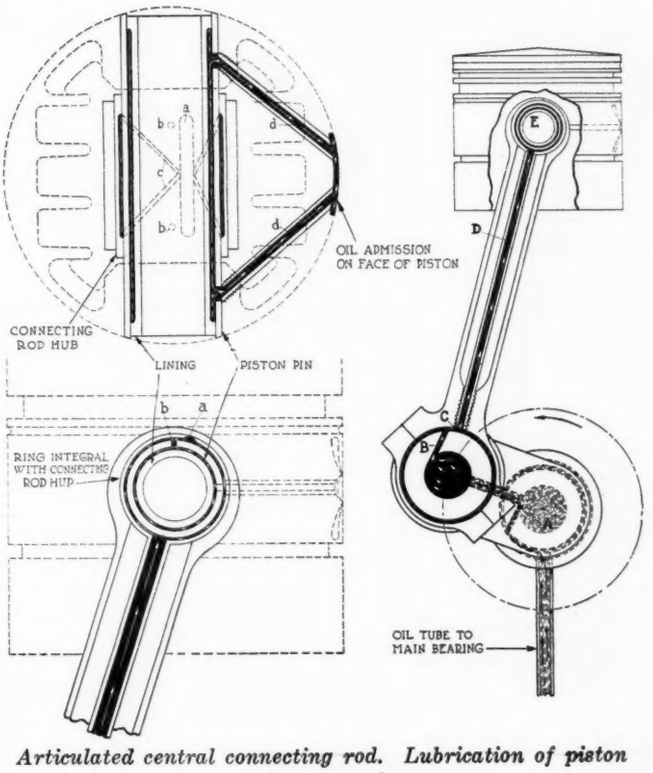
Time being valuable, the first engines produced by Barbarou were six-cylinder vertical types based on Mercedes design. This was the best way to get good results in the shortest possible time, and Barbarou was particularly qualified for this work by reason of the long experience he had had with six-cylinder engines built for the Delaunay-Belleville Co.

The first engine was a six-cylinder of 150 hp., which went into service on the planes used in 1915. This power was soon found to be insufficient and, in consequence, an eight-cylinder engine of 160 hp., measuring 120 x 140 mm. bore and stroke, was produced. To get an increase in power to 250 the stroke was increased to 175 mm. This engine was in regular production both at the Lorraine-Dietrich and other shops up to the end of the war.

The call came for still higher power and, to satisfy this, the eight was made into a twelve, developing 400 hp. and having the same size cylinders, namely, 120 x 170 mm. By the time this engine was in regular production the men at the front called for still bigger units, and the 500 hp. twelve came forth with cylinders of 126 mm. bore and a stroke of 200 mm. In the last year of the war it had been decided that engines of 1000 hp. could be successfully used on bombing planes and Lorraine-Dietrich prepared designs for this. The engine was of the Y type, with 24 cylinders, water cooled, with valves in the head operated by cam shaft in the base chamber and the use of pushrods. The signing of the armistice made it unnecessary to put this engine into production.

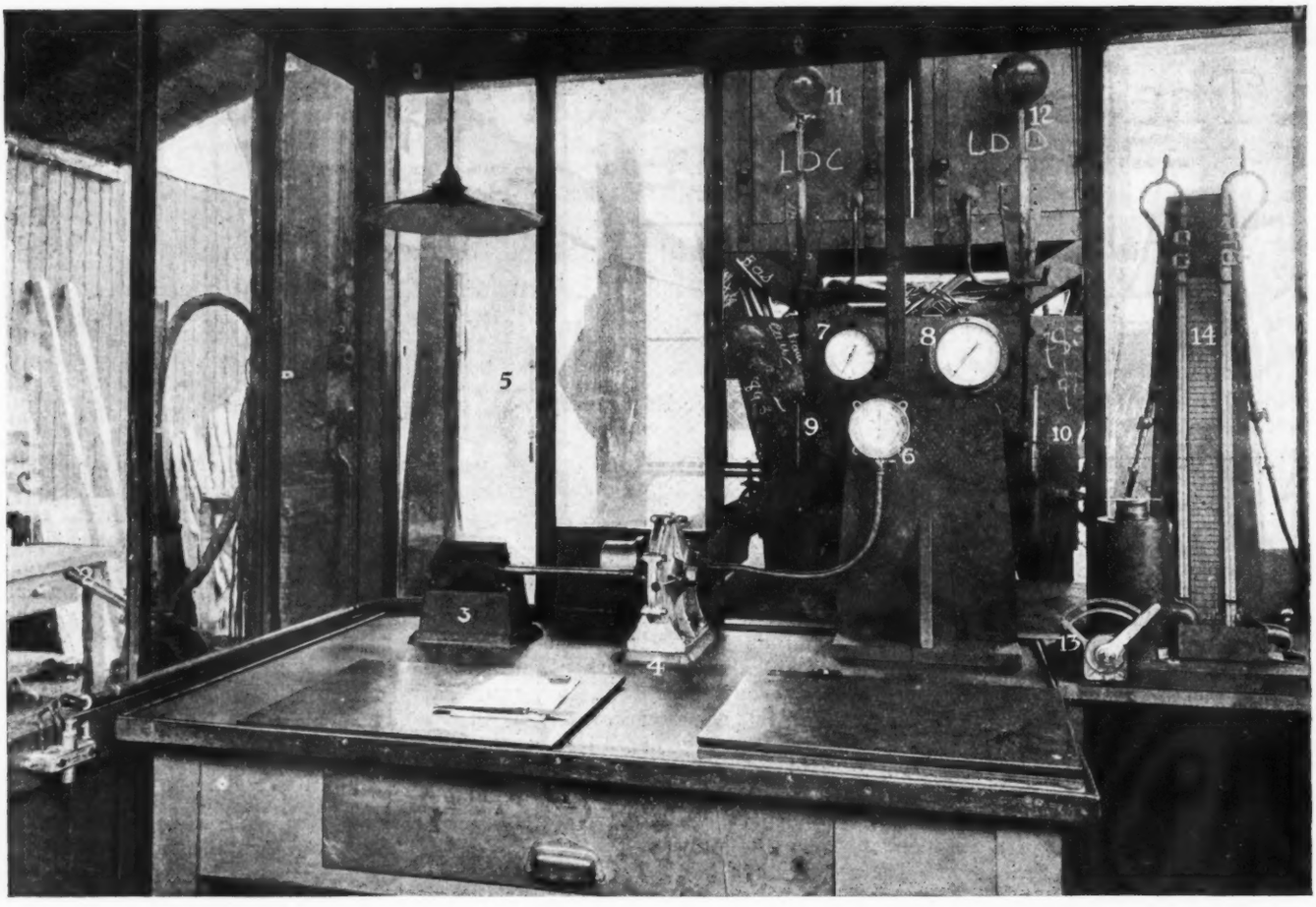
Much valuable experimental work was carried out in the Lorraine-Dietrich factory throughout the war. Most of this was for the benefit of their own production, but much work was also done for the Ministry of War. When the first Liberty engines came to France, Engineer Barbarou undertook to eliminate the carbureter and intake manifold defects which were discovered, and was officially thanked for this service by the Secretary of War.

Every Lorraine-Dietrich engine was tested in the open air but, in order to assure accuracy of control, the engineers were housed in a well-lighted, almost sound-proof cabin just behind the engine. Here they could work as accurately as in the drawing office, for they had all the instruments before them, they were protected against the weather and were heated in winter and, having electric light, they could carry out tests during the night just as accurately as in the day. There was one such cabin for each test bench. The exhaust was collected from the engines and carried away underground, so as to reduce the noise as much as possible. In the early days all engines were



Articulated central connecting rod. Lubrication of piston and piston pins

A—Oil passage through crankshaft.
B—Oil outlet from crank pin.
C—Oil inlet to connecting rod. Connecting rod hub.
D—Oil tube extending up connecting rod shank.
a—Oil groove in piston pin ring.
b—Holes in piston pin.
c—Grooves leading oil into slot a.
d—Tubes carrying oil from the surface of the piston.



At the Lorraine-Dietrich factory all aviation engines were tested in the open air, but the engineers remained in a well-lighted, almost sound proof cabin with all the instruments in front of them

1—Double switch. 2—Hand gasoline pump. 3—Engine revolution counter. 4—Revolution counter reduction gear. 5—Thermometer indicating temperature of outside air. 6—Engine tachometer. 7—Thermometer indicating temperature of oil in engine base chamber. 8—Oil pressure gage. 9 and 10—Thermometer indicating temperature of gasoline as it enters the carbureter. 11 and 12—**Gaged glass vessels for measuring gasoline consumption.** 13—Gasoline adjustment on carbureter. 14.—Indicator of vacuum in carbureter corrector tube.

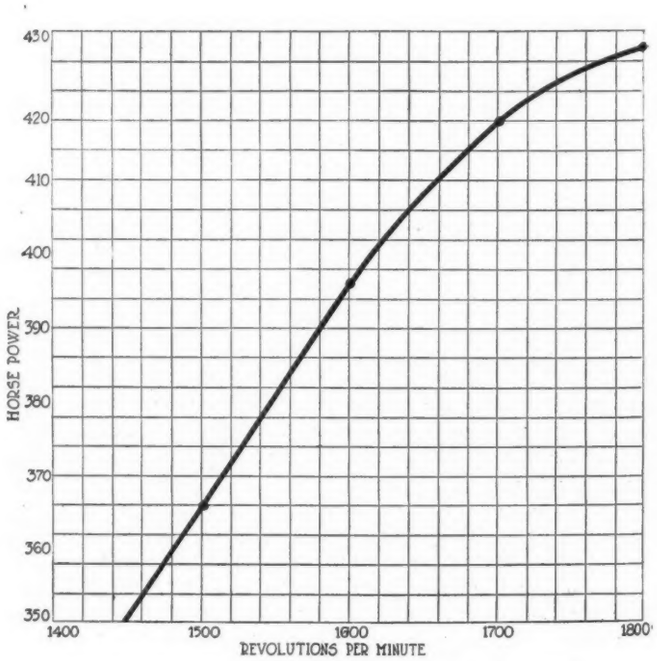
tested with open exhaust, and as these tests went on day and night, sometimes with a battery of six to ten engines running together, life was made intolerable for the dwellers in certain neighborhoods.

Under the Lorraine-Dietrich system the testers' cabin was immediately behind the engine and, there being windows on all four sides, good natural light was available. The instruments brought inside the cabin were the ignition switch, a revolution counter, together with the attendant reducing gears, an engine tachometer, a distance-type thermometer indicating the temperature of the oil in the base chamber, an oil-pressure gage, a gasoline adjustment lever acting on the carbureter and an indicator of the vacuum in the carbureter corrector tube. Outside the cabin, but visible through the glass windows, were a hand gasoline pump, a thermometer indicating the temperature of the outside air, a thermometer indicating the temperature of the gasoline as it entered the carbureter and two gaged glass vessels for measuring gasoline consumption.

The 12-Cylinder 400 hp. Model

With the exception of the 24-cylinder 1000-hp. engine, all the Lorraine-Dietrich products had overhead valves with overhead camshaft. The big unit had the camshafts in the base chamber.

In the case of the 400-hp. 12-cylinder model, which was the type in big production when the war ended, the cylinders were mounted at an angle of 60 deg. and were separate steel forgings with a common waterjacket for the pair. Each cylinder barrel was formed with eight stiffening ribs, the ribs of two cylinders forming a pair slightly



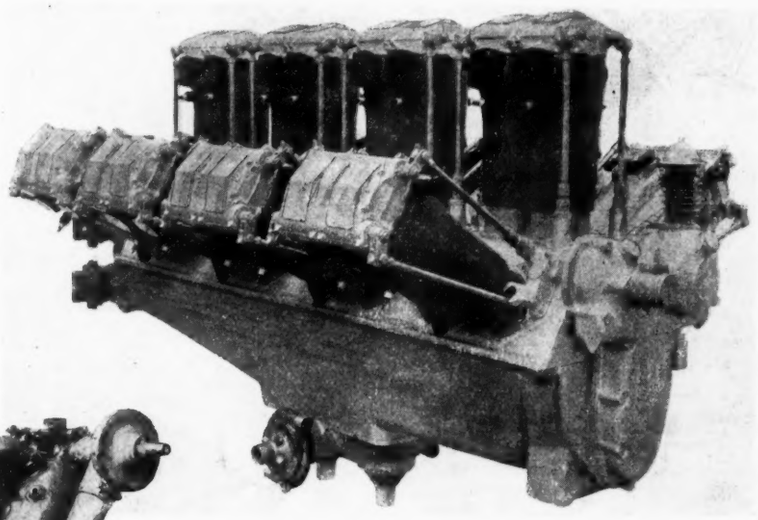
Power curve of 12-cylinder, 120 x 170-mm. engine

overlapped to save as much space as possible. A cast iron head screwed into and welded to the cylinder barrel received the two inlet and the two exhaust valves.

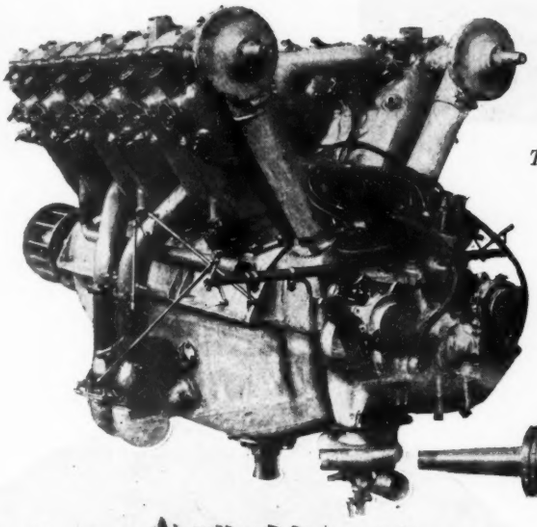
The crankshaft, which has a diameter of 63 mm., is carried in four plain bearings, having lengths of 115, 70 and 80 mm. In addition, there is a double thrust ballrace at the propeller end. The four crankshaft bearings are fitted to the upper portion of the crankcase, which is heavily ribbed at these points to assure rigidity. The lower portion can thus be withdrawn without disturbing the main bearings.

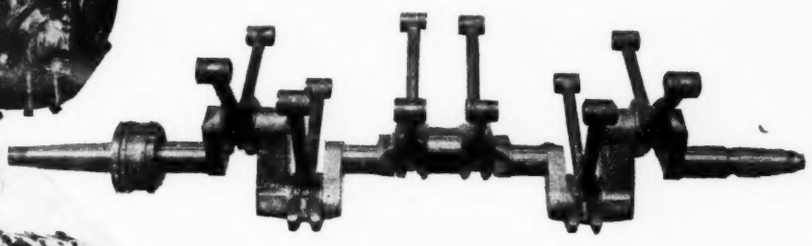
Hollow tubular connecting rods, machined all over, are used. They are of the forked type, the central rod being mounted direct on the shaft, with white-metal bearing surface, the forked rod being mounted around the latter. The forked rod is lined with phosphor bronze drilled with a number of small holes into which white metal is poured. Aluminum alloy pistons are employed and are fitted with six rings, five being above the piston pin and one below it. The piston pins are fixed in the connecting rod and oscillate in the piston bosses.

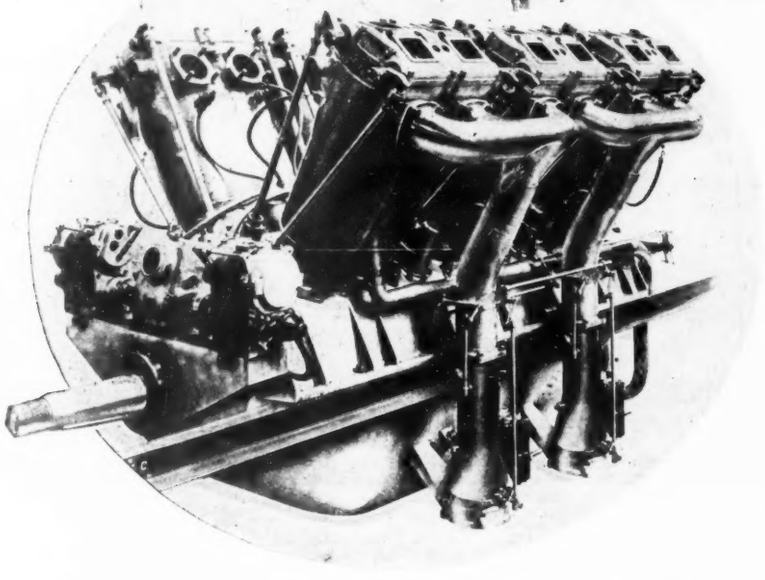
The camshafts are mounted above the cylinders and are driven by means of bevel gearing and a vertical shaft from the rear end of the engine. There are four valves per cylinder, of tungsten steel, operated by rocker arms and fitted with concentric springs. Each rocker arm carries a hardened steel roller that is in contact with the cam and is enclosed by a detachable aluminum cover. The timing of the 400-hp. engine is 5 deg. lag for the opening of the intake valve and 45 deg. lag for the closing. The exhaust valve has 50 deg. lead for the opening and 13 deg. lag for the closing. For the 500-hp. 12-cylinder

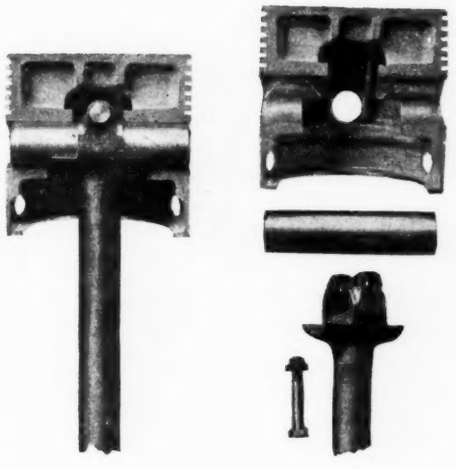


Twenty-four cylinder 1000-*hp. Lorraine engine developed during last year of war*

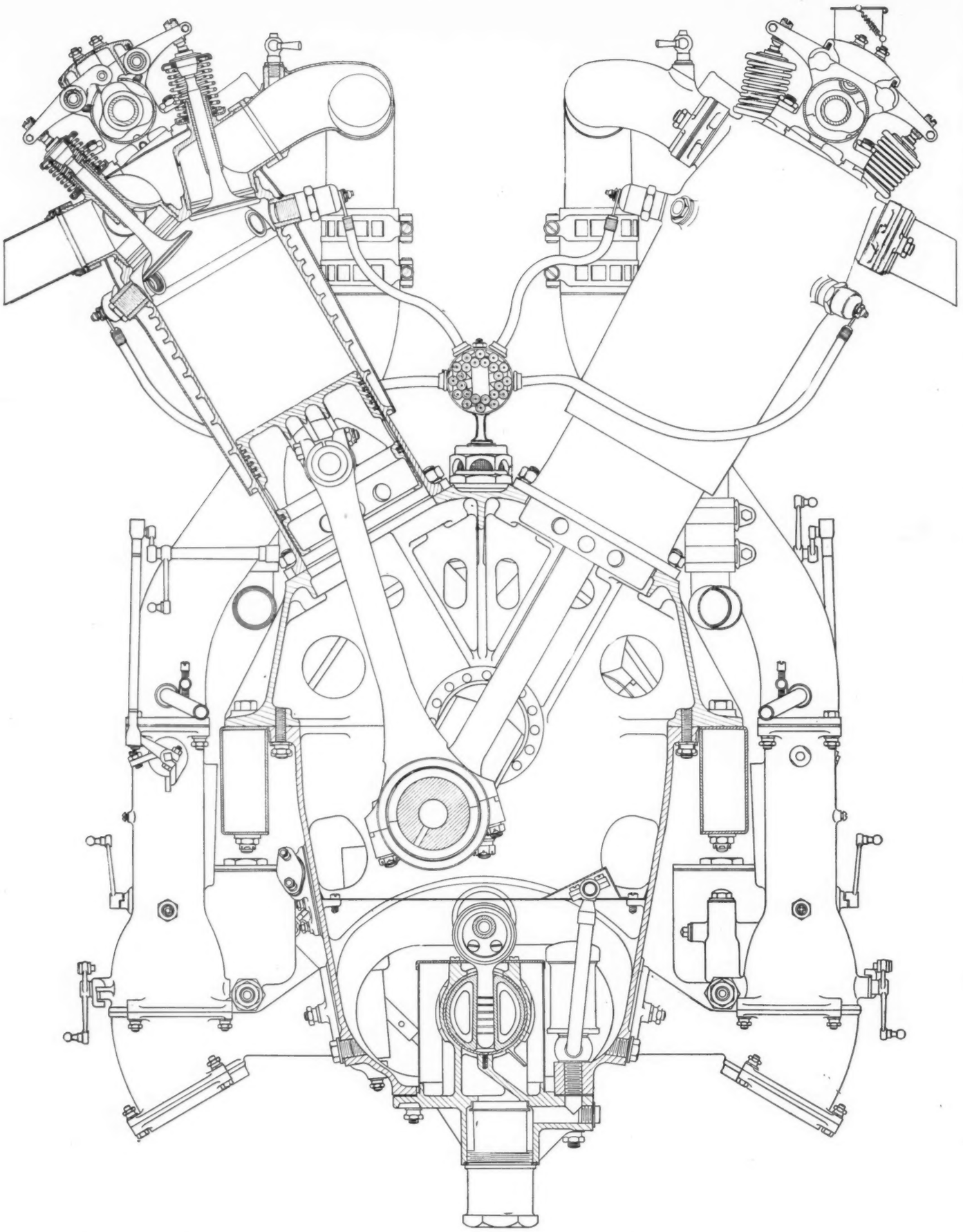






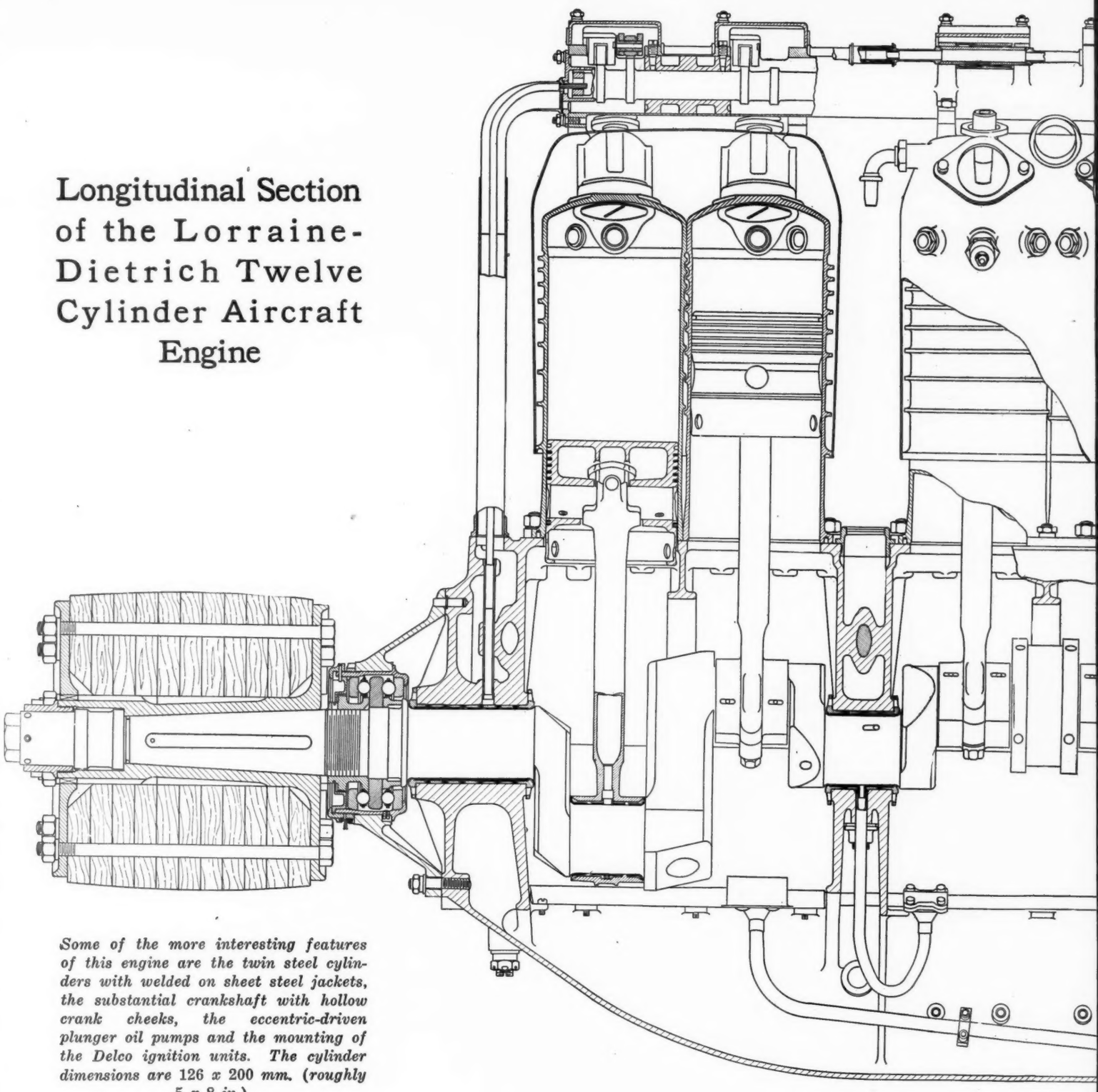


Two views of the 12-*cylinder,* 500-*hp. Lorraine-Dietrich engine* (126 *x* 200 *mm.*) *and views of some of its parts*

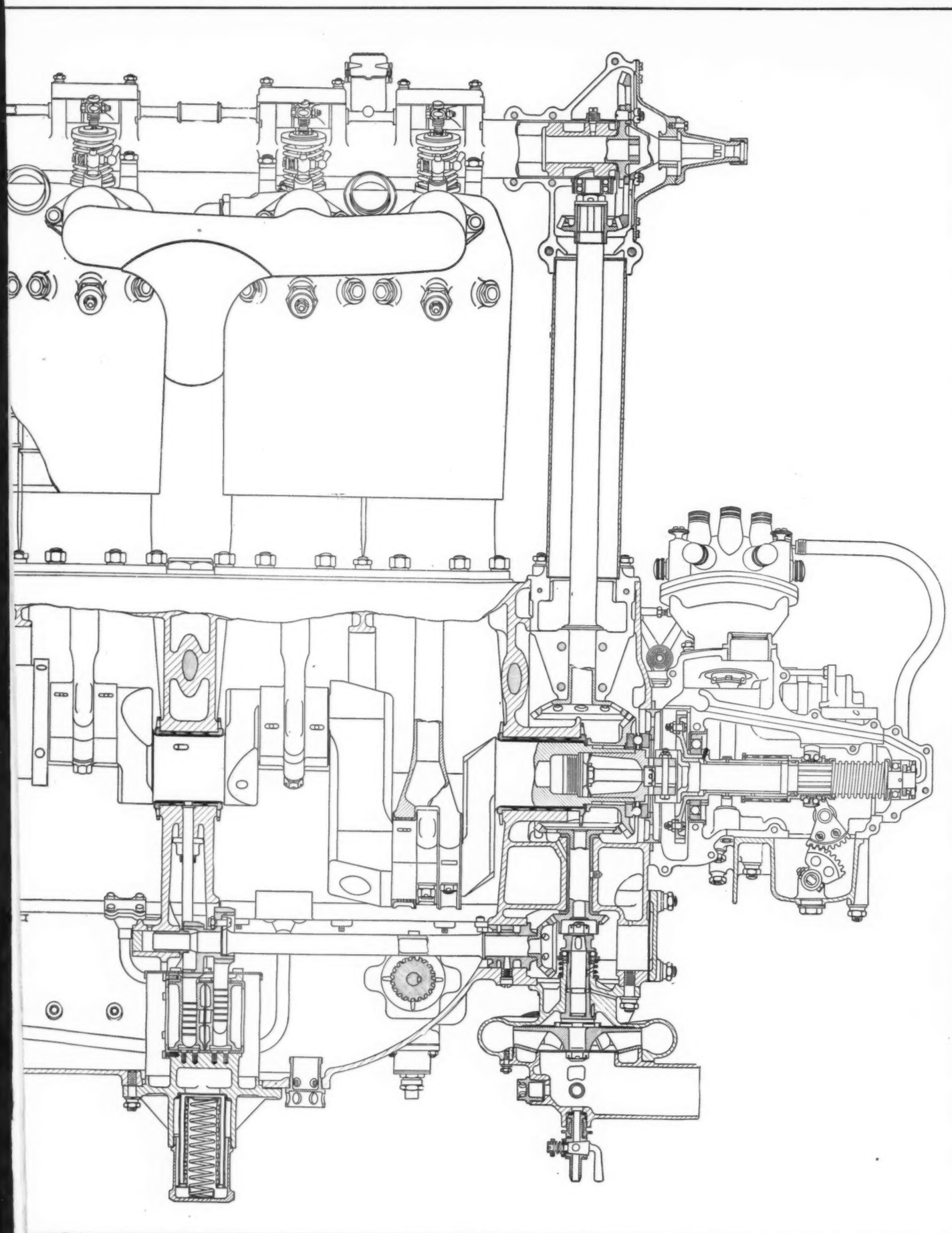


Transverse section of Lorraine-Dietrich twelve cylinder aircraft engine

Longitudinal Section of the Lorraine-Dietrich Twelve Cylinder Aircraft Engine



Some of the more interesting features of this engine are the twin steel cylinders with welded on sheet steel jackets, the substantial crankshaft with hollow crank cheeks, the eccentric-driven plunger oil pumps and the mounting of the Delco ignition units. The cylinder dimensions are 126 *x* 200 *mm. (roughly* 5 *x* 8 *in.)*



engine, the camshaft is mounted in the base chamber and has 18 cams, of which 12 are for the exhaust and 6 for the intake. Each intake valve operates the valves of two opposed cylinders.

On all the Lorraine-Dietrich engines, the carbureters are mounted on the outside of the group, attached to the lower portion of the base chamber. On the 400-hp. set the intake pipes pass between the pairs of cylinders to the inside of the angle. Each carbureter feeds three cylinders.

The exhaust is on the outside of the cylinders. This arrangement has been changed on the 500-hp. 12-cylinder, where the carbureters and the intake manifolds are on the outside, with the exhaust on the inside.

Delco ignition, with the distributors on the ends of the camshafts, has been used on all the 400-hp. 12-cylinder engines, although, on the larger model, high tension magnetos with separate distributors have been employed.

Lubrication System

Lubrication is of the force feed type with the oil contained in the base chamber and a supplementary supply in a tank above the engine. This supplementary supply is automatically fed to the engine as the level is lowered and an air pipe from the base chamber to the oil tank is uncovered. This air pipe is within a casing in the base chamber, so that its extremity is not likely to be uncovered by extreme inclination of the engine. There is a cock at the base of the oil feed pipe which prevents the tank being emptied when the filler cap is removed.

Lubrication of the main bearings and of the connecting rod bearings follows standard lines. The method of lubricating the piston pins is a patented feature and is not the same for the forked as for the straight rod. In the case of the latter rod, the oil is taken to the pin through the hollow rod. Within the piston pin there is an aluminum bushing forming a circular chamber into which oil arrives under pressure by circular groove cut in the piston pin bushing and a transverse oil lead. There are two holes in the upper portion of the piston pin to allow the oil to reach the above mentioned circular chamber. There are two oil leads in the piston from this oil chamber to the face of the piston in contact with the cylinder walls. The oil holes only register during a portion of the compression stroke, thus the cylinder walls are only lubricated under pressure at that time.

On the forked rod the method is different. Here a circular groove on the piston collects the oil from the walls and carries it to the interior of the piston pin, the ends of which are closed so that it cannot escape laterally. Oil grooves lead the lubricant to the piston pin bushings. It should be noted in connection with the piston construction that the upper portion of the piston pin bushing is much longer than the lower portion.

Making Eyes on Airplane Cables

UNTIL recently most of the eyes at the ends of airplane cables were made by hand. That was before the method used during the war, although just before the armistice machines were tried and found to be speedy and reliable. Many of the machine-made eyes or terminals are sufficiently strong to hold without soldering, and tested specimens frequently show a resistance equal to the full strength of the cable.

The illustrations show the kind of work of this character that can be turned out by machinery. The machine by which the terminals were made is also shown herewith. It is manufactured by the Edstrom Machinery Co. and has been used by the U. S. Government in extensive tests of airplane work. On the lower portion of the machine can be seen a spool for holding a special wire used in wrapping the terminals, and a little higher up is shown the wire passing around a stationary spindle to secure the necessary tension. Additional tension is obtained from a spring pressed against the right end of the spool by a lock-nut, which also provides an easy method of regulation.

Edstrom machine for wrapping cable terminals

Products of Edstrom wire-wrapping machine

The eye of the terminal is formed in an operation preceding that of wrapping. Attached to the rear of the machine is a special bending fixture used in the process. The cable is placed between forming pins, one of which is attached to a swinging lever. By a movement of the lever the cable is bent into the proper form for the eye and is temporarily held by a turn or two of soft wire, which is finally taken off automatically by the machine when the terminal nears completion.

When the loop has been formed, the thimble is inserted and the end of the cable gripped firmly in the jaws of the machine, the rest of the cable being led out through a central tube. If desired, spacing for soldering can be made automatically at intervals of about an inch along the wrapping.

Besides increased uniformity, a rate of production greatly in excess of that attained by hand methods is claimed for the machine process.

Analysis of German Trucks by the Motor Transport Corps

This article continues the report on the trucks surrendered to the A. E. F. under the terms of the armistice. The results of the investigations and tests are being made public as rapidly as they are completed for each truck.

By C. R. Hays*

Hering

THE motor is four-cylinder, L head, 5⅛ in. x 6 in. bore and stroke, four-point suspension, suspension by lower half of crankcase.

Cylinders are cast in pairs, with valves on the right-hand side of the motor. The water enters on the opposite side of the cylinders from the valves, rising to a large dome at the top of the cylinder blocks, with a large water area around the cylinder walls, and especially over the heads, where the water area is 2½ in. between the cylinder head and the top of the water jacket. The combustion chambers are flat type, heavily webbed on top. The water area extends down only one-half way the length of the cylinders. The cylinder walls are ½ in. thick and chamfered at the bottom for easy assembly of pistons. The valve guides are of cast iron construction, 4½ in. long and are screwed into the cylinders, there being no protection for the valves against dust. The exhaust and intake manifolds are held on by crow feet and four studs screwed into the side of the cylinders. The intake manifold is of cast aluminum, Y type, with fairly good symmetrical lines. The exhaust manifold is of cast iron, exceptionally large.

Flywheel and Crankcase

The flywheel is of cast iron with a sheet metal rim, having 26 fan-shaped fins bolted outside of rim. The dia. is 17 in., width 5 in. The counterbore on the inside is 3⅜ in. for cone clutch. Semi-finished all over.

The upper and lower halves of the crankcase are of cast iron with lap joints and no gaskets. The front and rear crankshaft bearings are carried in the upper and lower halves of the crankcase. The center crankshaft bearing is carried on the lower half of the case, there being two long studs with shoulders on each one holding down bearing cap into the lower half of the case, extending through the lower half of the crankcase with nuts on the ends. This makes an individual, self-contained bearing in the lower half of the crankcase. The other ends of the studs extend up and go through the top half of the crankcase, which helps to hold this case together. The lower half of this crankcase is very heavily ribbed, the ribs forming individual oil pockets for the connecting rods. The upper half of the case is of good construction with no special features, excepting large, cast integral oil pockets over front and rear crankshaft bearings. The bolts that hold the motor to the sub-frame extend through upper and lower halves of the case.

Crankshaft is of a peculiar type of construction. The cheeks next to the bearings are 1 3/16 in. thick by 3⅛ in. wide and 8¼ in. long; half of the length is used for counter-balancing. Between the connecting rod bearings instead of the cheeks going 180 deg., as in customary practice, they oblique off at 90 deg. The reason for this is to get a 6¼-in. distance between the center of the connecting rod bearings. This is necessary because of the large bore of the motor, which really should have a five bearing crankshaft support instead of a three. This crankshaft is machine finished all over with square edges, and very large fillets between the cheeks and bearings. The fly wheel flange is forged integral with the crankshaft. Instead of the customary type of flange and bolt fastening there is a continuation of the crankshaft past this flange long enough to go completely through the thickness of the fly wheel, 3 in. in dia. and 2½ in. long.

Crankshaft bearings are babbitt lined, steel backed. Front bearing is a solid sleeve, non-adjustable, sliding on the end of the crankshaft, 2⅛ in. in dia. x 2¼ in. long. Center bearing is 2⅛ in. in dia. x 3¾ in. long. Rear bearing is 2⅛ in. in dia. x 6 in. long. The center bearing is carried in lower half of case and held by 2½ in. studs and cast-iron caps. Rear bearing is carried in upper and lower halves of crankcase.

Connecting Rods and Bearings

Connecting rods are I-beam, drop forgings, semi-finished, with one bolt on each side holding the caps.

The bearings are babbitt lined, bronze backed, 2⅛ in. in dia. x 2⅜ in. long. The adjustment is by the shim method. The piston pin bearings are pressed into the connecting rods and are bronze sleeves with holes on top of the connecting rods for oil collection for lubrication. Oil holes on each side of connecting rods for collection of oil by passing it to connecting rod bearings.

Pistons and Pins

Pistons are dome type with four ¼-in. concentric hammered piston rings, three being used for compression and one at the bottom end of the skirt as an oil wipe ring. These rings are lap joint type, 3/16 in. thick x 5⅜ in. in dia. when free. There is an oil groove 1/32 in. deep x 1 3/16 in. wide running around the piston at the location of the piston pins. The piston pins are 2⅜ in. center from top of piston, the piston being 5⅛ in. long. A heavy rib at the end of the skirt is recessed for the oil wipe ring. Pistons are ground.

Piston pin is a hollow pin 1 1/16 in. in dia., hardened and ground, and held into the piston by the regular set screw method.

*Mr. Hays is chief of the experimental section, Motor Transport Corps.

Timing gears are the spur gear type. The crankshaft gear is a soft steel forging, 3 15/16 in. in dia., 23 teeth, with 7/8-in. face and 3/8-in. depth of teeth, 1/4 in. thick at base and held onto the crankshaft with a 3/8-in. dowel pin, going through the gear and shaft. The camshaft gear is a bronzed casting, meshing directly with the crankshaft gear. This gear is brazed onto a steel sleeve, which is pressed onto the camshaft with a straight key to hold it in place. Forged integral with the steel sleeve is a 13/16-in. x 3¾-in. spiral gear, which drives a cross shaft, which in turn drives the water pump and magneto.

Camshaft and Bearings

Camshaft is a forging, 1⅛ in. in dia. and hardened, with cams forged integral with the shaft. The true circle of cams is 1½ in. in dia., with 3/8-in. face, and a 5/16-in. lift.

Camshaft bearings are supported by three bearings, which are bronze sleeves pressed into the crankcase. A large boss is forged integral on the camshaft, allowing the center bearing to be large enough to slip off over the cam. Auxiliary cams on the side are set at a 90 deg. angle from the exhaust cams and are used as compression release cams, the compression release being wedges on bell crank arms, worked by shaft on the outside of the motor. These wedges are pushed between the auxiliary cams and the valve tappets, raising the valves off their seats.

Valves, Governor and Oiling System

Valves are of the roller type, with a 5/8-in. dia. tappet body, soft steel. The adjusting tappet screws into the tappet body, and is locked by a jam nut.

The tappet guides are 3¼ in. long, soft steel, and held down by crow feet.

Governor is the fly ball type, located on the crankshaft, timing gear at front end of motor. This governor is constructed with two fly balls out of forging with a bell crank arm, and rollers engaging into a sliding collar on the crankshaft. The spring slides on the crankshaft, one end being against the sliding collar. The controls of this governor are the regular forked bell crank style, leading to the governor valve on the carbureter. This type of governor is very simple, compact and well made. It should give exceptionally long service and is a good production proposition.

Lubrication is by a force feed plunger pump, located upon the dash, the oil being forced through drilled web by-pass in the lower half of the crankcase to the three crankshaft bearings. Balance of lubrication for timing gears and camshafts is by oil vapor from the crankcase.

Water System

Water pump is centrifugal, 4 in. in dia. with bronze impeller, cast iron housing, with 1⅝-in. intake and a 1-in. discharge. This pump is mounted at the front end of the motor on the timing gear case and is driven by a cross-shaft, which in turn drives the magneto on the other end. The cross-shaft is driven by a spiral gear off the camshaft.

Ignition

Ignition system is a single system high tension type ZU4 Bosch magneto. The magneto is anti-clockwise, the advance and retarding by the conventional way, by advancing the breaker box. For checking up the secondary rotor a celluloid window is located opposite contact number one in the secondary distributor. Magneto is located on the right-hand side of motor, and is driven by a gear from timing gear case.

Carbureter and Fan

Carbureter is a Solex, 1¾ in. The throttle valve is a cast bronze rotary valve. Float is of sheet brass. The throat of the venturi is 29 mm. The idle adjustment is by a well and needle valve. The high speed adjustment is by nozzle and compensator. The carbureter is of cast brass, and so constructed that it forms a second venturi above the rotary throttle valve. There is nothing out of the ordinary in this carbureter, excepting that the fuel enters on top of the float chamber. The carbureter has a hot air attachment.

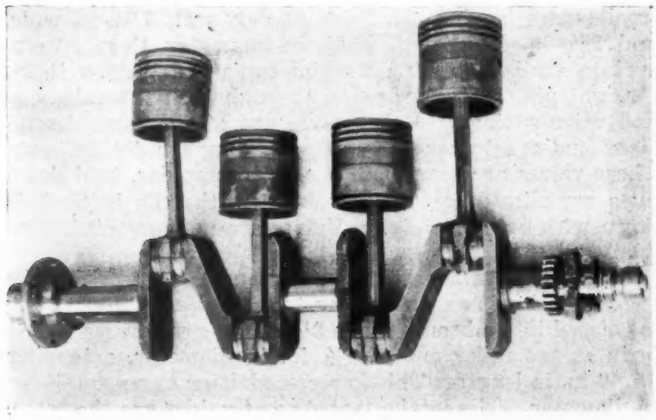
Fan, 22 in. in dia. Four blades. Material, sheet steel. Riveted to steel hub with machined fan pulley on rear end. The fan shaft is of steel and is mounted on single row ball bearing with an adjustment pressed into fan hub. The fan bracket is of steel tubing, having a slot 1/8 in. wide, 3½ in. long from the bottom of tube. The adjustment of fan is taken up through a clamp boss on the front gear case cover, allowing fan bracket to slide up or down and held in place by two clamp bolts.

Weights

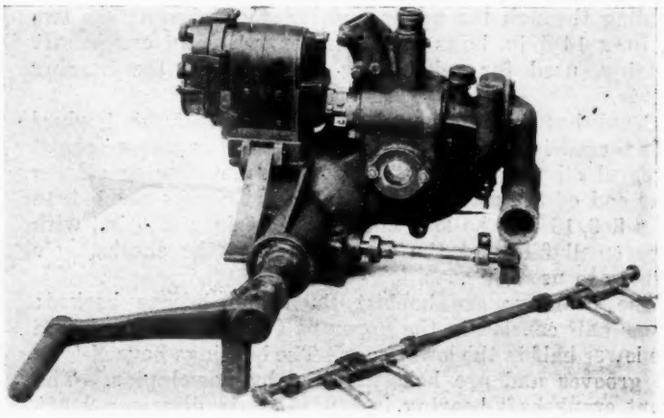
Piston and connecting rod complete; valve tappet assembly, 15 ounces; valve, 11 ounces; valve spring, 6 ounces.

Remarks

The construction of this motor is not good from the standpoint of service repair; it is supported by the lower half of the crankcase, and in order to adjust the connecting rods and crankshaft bearings, the motor must be completely disassembled, leaving the crankshaft in the lower half of the crankcase, with such parts as the front bearing of solid sleeve type, the center bearing carried by cap on lower half of crankcase, and the rear bearing with each half in upper and lower halves of cases. Another bad feature is that the timing gear case carries the starting crank, magneto mounting, water pump, fan bracket and



Crankshaft, connecting rods, pistons and governor assembly



Timing gear case and assembly. Compression release assembly. Pawls go between cams and valve tappets

breather. Before this can be disassembled, the radiator must be lifted and a trunnion bearing loosened underneath radiator on a cross member, which helps support starting crank. The complete motor carries only four gears, with balance of the construction very simple. The magneto, carbureter and valves are easily accessible. Workmanship upon this motor is of the average type. There is no surplus of parts or weight.

Nacke

THE motor is a four-cylinder, 4 3/16 in. x 6⅝ in. bore and stroke. Combination valve in the head and valve on the side. Four-point suspension, suspension by the lower half of the crankcase.

Cylinders

Cast in pairs, ½ in. walls, dome type, combustion chamber. No counterbore in combustion chamber, but counterbored at base of cylinders. Cylinders are held down by six ½ in. studs. Exhaust valve guides are cast iron and pressed into the cylinders. Valves are located on the right hand side of the motor with the intake valves directly over the exhaust valves. Exhaust valve seats are on an extended web, extending up 5/16 in. above the solid casting, having individual ports for each exhaust valve. The intake port is on the left hand side of the motor leading across above the explosion chamber into the water jacket. The water enters at the base of the water jacket on the opposite side of the valves, flowing and rising around valve seats and exhaust guides, and is discharged on the same side as it enters. There is a 2½ in. water area between cylinder head and water jacket. The spark plugs are located in the center of the combustion chamber and set in pockets 3 in. deep. The priming cups are located on the right hand side of the motor, directly under the intake valves. The exhaust manifolds are of cast iron. The intake is of steel tubing and of the ram horn type. The cylinder base on the left hand side is milled off for the clearance of the connecting rods. The crankshaft is offset in the center of the motor approximately ⅜ in.

Flywheel

Flywheel is of cast iron, semi-finished all over, 19 in. in diameter, 3¾ in. wide. Counterbored 3 in. for cone clutch. Thickness of rim is ⅞ in.

Crankcase, Crankshaft and Bearings

The upper half of the crankcase is of cast aluminum, of an exceptionally good grade of workmanship and construction, with two inspection holes on left hand side. The lower half of the crankcase is of cast iron with an oil reservoir cast integrally. Oil troughs are thin pressed steel, held in place by fillister head bolts. The joints of the upper and lower half of the crankcase are lapped joints. The lips of the upper and lower half of the case are ⅝ in. thick, the walls of the case ½ in. thick. Extending through the upper and lower crankcases are two ⅝ in. x 14¾ in. bolts at the center and front crankshaft bearing, used for reinforcing the cases at the bearing points.

Crankshaft is drop forged, machine finished, the flywheel hub forged integral on the shaft. There is also a forged integral oil ring for preventing oil from flowing off the rear end of the crankshaft. The short cheeks are 1 1/16 in. x 2 9/16 in., the long cheeks 1 5/16 in. x 2½ in., with very small fillets at the end of pins at the cheeks. No shims are used on caps.

The bearings are babbitt lined and bronze backed; upper half carried in the upper half of the crankcase and the lower half in the lower case. The bearings have X-type oil grooves and are held in place by dowel pins. The front crankshaft bearing is 1 9/16 in. in diameter x 3⅛ in. long; the center bearing 1 11/16 in. in diameter x 3 in. long, and the rear bearing is 1 13/16 in. in diameter x 3½ in. long.

Connecting Rods and Bearings

I-beam, drop forging and rough. A large oil pocket is forged integral at the upper end of the connecting rods. Connecting rod caps have forged integral oil scuppers, but no shims are used.

Connecting rod bearings are babbitt lined, bronze backed, 1 13/16 in. in diameter x 2¾ in. long, being held in place with dowels and four 7/16 in. bolt caps. Piston pin bearings are bronze sleeves, pressed in the upper end of the rod.

Pistons are of cast iron, conical head, 4⅝ in. long with 3¼ in. lapped joint, hammered, concentric, compression rings, and one oil wipe ring located 1¾ in. from bottom of piston. Bottom of piston has a ⅛ in. rib. Pistons are ground.

Piston pin is 15/16 in. in diameter and located 2 9/16 in. from top of piston, held in place by set screws. Running around the middle of the piston is a recess 1/32 in. x 13/16 in.

Timing Gears, Camshaft and Bearings

Timing gears are of the spur gear type of steel forging. Crankshaft timing gear is pressed on the crankshaft and held by a straight key and nut, 3¼ in. in diameter, 24 teeth, ¼ in. deep, 3/16 in. base of tooth and 15/16 in. face —not hardened. The two idle gears and water pump gear are hardened. Camshaft and magneto gears are soft steel.

These gears are all fastened on the shafts by straight key and nut. The bosses of these gears are threaded so that a gear puller can be screwed onto them to pull them off. The idle gears, magneto and water pump gears are supported on two annular ball bearings.

Camshaft is a drop forging with cams forged integral, 15/16 in. in diameter, hardened and ground all over. It is supported by four sleeve type bronze bushings. True cam radius of 1½ in., ⅝ in. face and lift of 5/16 in.

Camshaft bearings are bronze bushings pressed into the case. Forged at the point of the two inner bearings are bosses, which allow the bearings to be large enough to be slipped off over the cams.

Valves, Valve Tappets and Guides

Valves are of a mushroom type. Exhaust valve 2 13/16 in. diameter head, ¼ in. thick, 45 deg. seat, 3/16 in. wide, and 7¾ in. long, with a ⅜ in. diameter stem. Valve springs are held on by a machine cap and a ⅛ in. x ½ in. straight pin, the pin running through both the valve cap and valve spring. Intake valves are of the same dimensions and construction, except that they are 4⅝ in. long. These valves are carried in a cast iron spider, held down by a complicated cast iron valve cap, the cap being held down with cast crow feet. Valves are not protected from dust and grit.

Exhaust valve tappets are of the roller type, with the regular lock nut and adjusting tappet. Valve tappet body is carried into a bronze guide 2½ in. long, the valve tappet body at the roller end is 1¼ in. in diameter, extending 15/16 in. in length. This is recessed down to a stem ⅜ in. in diameter. The intake tappets and guides are the same, except that the adjusting tappet is counterbored at the end to take a 9/32 in. push rod, this push rod operating a rocker arm, which in turn operates the intake valve.

Governor is fly ball type, located on the dash, in a cast aluminum housing. On the front end of the drive shaft at the rear of the transmission is located a 6 in. pulley; from there a belt drive, another pulley fastened on the end of the shaft and the shaft running along the side of the frame and held by brackets. On the other end of the shaft is another pulley. From there a belt runs to the governor on the dash. From the governor the motion is carried by a rod to the governor valve on the carburetor manifold. This type of governor is a car speed governor and not a motor speed governor.

Oiling System

Oiling system is by a combination forced feed gear-driven pump and splash system. The pump is driven by a gear off the end of the camshaft on the outer rear end of the motor, the pump being fastened by a bracket to the lower half of the crankcase. The oil from the pump is taken from the bottom half of the crankcase and forced through a pipe conduit the length of the upper half of the crankcase. Through ribs on the upper half of the crankcase are drilled holes leading from this conduit to the crankshaft bearings.

Water System

Water pump is driven by gear and shaft; the impeller is 5 in. in diameter and is of cast iron, the body also of cast iron. The water enters through the center of the pump and is discharged directly overhead—the intake and discharge are the same, ¾ in. in diameter.

Ignition

Ignition system is a single system, high tension, type ZR4 Bosch magneto. Magneto is clockwise, with the customary advance by advancing the breaker box. For location of the secondary rotor a celluloid window is placed opposite contact number or in the secondary distributor cover. The magneto is located on the right hand side of the motor and is driven by shaft and flexible coupling. Coupling is constructed of thin laminated spring steel.

Carbureter

Carbureter is a vertical Pallas, type V, 1¾ in., with a 26 mm. venturi throat. The float is of cork and shellac. The idle adjustment is by a stationary well. The carbureter is of cast aluminum with no special features. The high speed is through a well running angular through the venturi, the fuel being restricted by a compensator. The throttle valve is a butterfly type. The carbureter has a hot-air attachment.

Fan

The fan is 2½ in. in dia., four blades, material sheet steel, riveted to cast steel fan hub, having a machine fan pulley on rear end. Steel fan shaft mounted on a ball bearing, with adjustment on the front end of fan hub. The adjustment on fan is taken up through a machine slot on head of fan shaft bracket. The material of fan shaft bracket is cast iron. A sheet steel lock, consisting of two sheet steel plates, riveted to a small spacer, has ⅝ in. holes punched. This lock fits over the fan shaft, and also fits in slot machines in head of fan bracket. The fan shaft is adjusted to proper length, when this lock is tightened by use of a lock washer and not on end of fan shaft.

Weights

Piston, 4 lb. 4 ounces; valve tappet assembly, 14 ounces; exhaust valve, 10 ounces; intake valve, 8 ounces; valve spring (exhaust 4 ounces; intake, 3 ounces).

Remarks

This motor could not be called a good service job, with such things as the upper and lower crankshaft bearings carried in the upper and lower half of the crankcase, and suspension by lower case. In order to adjust the bearings, the motor has to be completely disassembled, and the crankshaft bearings have to be shimmed or replaced. The most unique item of construction is the threading of the bosses of all the gears so that they can be easily pulled. The most unusual element of design are the large unnecessary cast iron intake valve caps, and the peculiar construction and smallness of the valve tappet guides and large cylinder castings. Cylinder castings are large and heavy enough for a motor 2 in. larger in bore than this motor. The workmanship as a whole, is very fair.

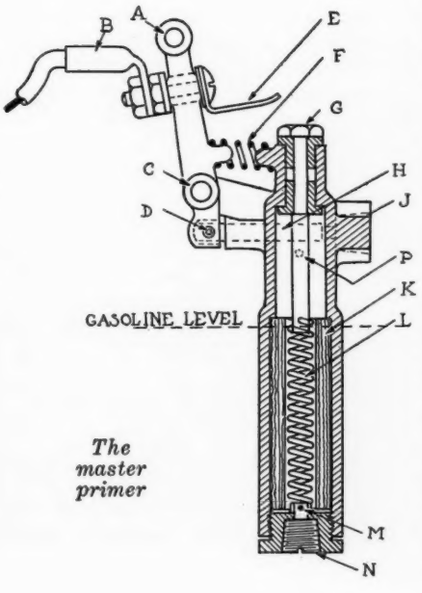
Preheated Fuel Spray

THIS is a device which enables the driver of a car to spray a certain amount of preheated fuel into the intake manifold, the fuel on its way to the manifold passing over an electric heating coil. It is operated by means of a button on the dash.

As shown in the illustration, the fuel supply is brought direct from the carburetor by means of a feed line connected between N and some point in the carburetor where the gasoline level is controlled by the float. This connection maintains the fuel level as indicated. Electric cannection is made by operating the lever A from the dash. When contact strip E is brought in contact with bolt heat G, the coil is quickly brought to a high temperature. The same operation withdraws needle valve H from its seat and provides an outlet through J into the intake manifold. The heating coil is insulated by the porcelain K.

All other current-carrying parts are well insulated by Bakelite tubing and washers. The coil L raises the temperature of the gasoline at the rate of 14 deg. F. per second, or from zero to 70 deg. in five seconds, it is claimed.

Contact having been made and the needle valve drawn from its seat by the same movement, the suction of the motor is applied to the inner chamber of the primer. By operating the primer button a few seconds prior to stepping on the starter switch, the gasoline is heated before the motor begins to turn over. The device is known as The Master Primer. It is a product of the Splitdorf Electrical Co., manufacturers of magnetos and other devices.



The master primer

Steinmetz Develops New Vehicle Motor System

A new method of excitation by which the advantages of a series and a shunt motor are combined, to an extent, for vehicle propulsion is the basis of this new manufacturing venture—The system consists merely in connecting a single storage cell across the field winding of a series wound motor, floating the cell on the line.

By P. M. Heldt

IN practically all electric traction work the series type of motor is used, because of its excellent starting torque. This is especially great when the source of current supply is large, so that the throwing on of the motor does not cause any appreciable drop in line voltage. The only other basic type, the shunt motor, when supplied with current from a storage battery, has exceedingly little starting torque, due to the fact that when the armature is at rest, it practically short-circuits the field, and although an enormous current may flow through the armature, without an adequate field strength it is of no avail.

Aside from the heavy starting torque there is little to recommend the series motor for vehicle propulsion. Its two chief disadvantages are that its speed declines very rapidly with increase in load and that it does not lend itself to the recovery of energy in descending grades and in stopping. Even the high starting torque is not without its accompanying drawbacks, as may readily be shown. A series motor when operating at normal load probably has a field strength equal to about 75 per cent of its maximum. In starting, the current flowing through the field and armature may be three or four times as great, and as the energy expended in the field coils increases as the square of the current, the energy expenditure in the field may have to be multiplied many times in order to gain an increase in field strength of, say 20 per cent.

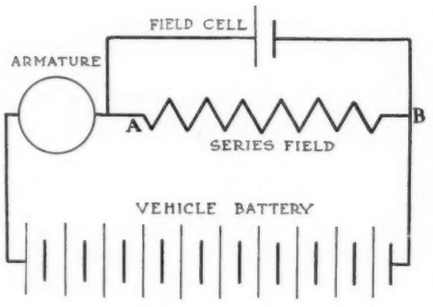


Fig 1—Diagram of Steinmetz motor system

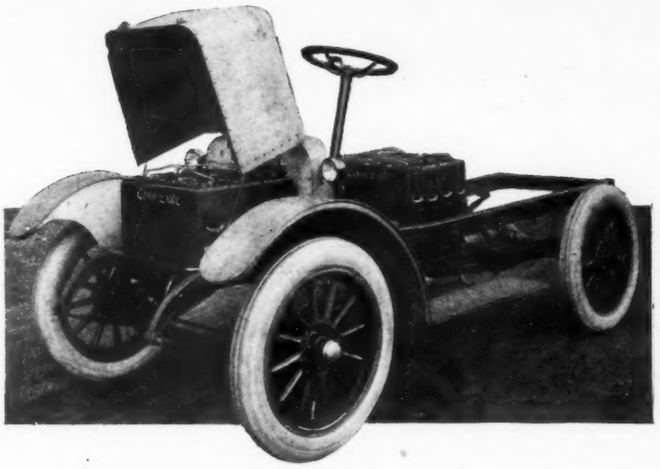
Dr. Charles P. Stienmetz, chief consulting engineer of the General Electric Company, has developed a new method of motor excitation by which he is enabled to combine the advantages of the series and shunt motor for vehicle propulsion to a certain extent. The system is simplicity itself, for it consists merely in connecting a single storage cell across the field winding of a series wound motor, floating the cell on the line. With the battery voltage and the field winding employed, the voltage drop in the field winding at about normal load is equal to the voltage of the field storage cell, and as the two voltages then balance each other, no current will flow through the cell. The arrangement is shown in the diagram, Fig. 1. At starting and on heavy grades, of course a current much above normal will flow through the armature, and the current through the field winding will also be increased. But with constant field resistance and an increased current the pressure drop between points A and B will now be greater than the electromotive force of the cell, and a charging current will flow through the cell. Similarly, if the motor current drops below normal, the field cell will discharge through the field coil, tending to maintain the strength of the field.

No matter how the load on the motor may fluctuate, the field strength varies only within relatively narrow limits, the minimum field excitation being that due to the storage cell alone. If the car runs down a grade under the influence of gravity, its speed will increase until the counter electromotive force generated in the motor armature exceeds the electromotive force of the vehicle battery. Then the motor, acting as a generator, will send a charging current through the vehicle battery, thus recuperating some of the extra energy spent in ascending the hill.

Dr. Steinmetz has organized a company, under the name of the Steinmetz Motor Car Co., with an office in New York City, which plans to manufacture electric commercial vehicles (delivery wagons) and industrial trucks embodying the above described motor system and various other novel features. The experimental work has been done mainly on a ½-ton delivery truck which was built in Chicago. The chassis with battery but without body weighs about 2300 lb. which is very light, as electrical vehicle weights go. It carries a 20 cell 250 ampere-hour lead storage battery of the Exide type and has an average mileage under normal road conditions of 45 to 50 miles.

Steinmetz makes use of a motor having a revolving armature and a revolving field ring. The advantage of this type of motor is that substantially twice the output can be obtained from a motor of given weight and absolute speed of members, as compared with the ordinary motor with stationary field. The motor is otherwise of conventional design, having an annular, laminated four polar field frame forming the outside member, and a drum armature forming the inside member. The commutator is of the regular cylindrical type, but the brushes are counterbalanced to overcome the effect of centrifugal force on them. There are four brushes, at quarters, opposite ones being connected together electrically.

The motor is arranged with its shaft at right angles to the rear axle. To the forward side of the pressed steel axle housing is bolted a cast steel housing inclosing the reduction gears. The armature is geared to one axle shaft



Chassis of Steinmetz ½-ton electric truck

through a pair of spur gears and a pair of bevel gears, and the field frame to the other. No differential gear is required, as the torque on both field and armature naturally is always the same, consequently the same driving torque is impressed on the two road wheels. At the front of the transmission case is the motor, which is supported in bearings in a sort of spider covered with sheet aluminum. The motor housing is spring-suspended at its forward end from the frame, and the motor and gear therefore are not absolute dead weight on the axle. There is a partition wall between the gear-case and the motor housing, so the gears can be run in oil without danger of oil getting into the motor and causing trouble there. Annular ball bearings are used on the shafts.

Speed control is effected by connecting the battery cells either all in series or in two parallel rows, respectively, and by cutting a resistance in and out with each battery combination. Thus four speeds are obtained as follows:

1—Battery in parallel, resistance in.
2—Battery in parallel, resistance out.
3—Battery in series, resistance in.
4—Battery in series, resistance out.

The Steinmetz Motor Car Co. is negotiating for a plant in Baltimore. For the first year an output of 1500 industrial trucks and 500 delivery wagons of 1000 lb. and 2000 lb. is scheduled. Other sizes may be made later. The construction will be as nearly standard as possible, only the motor and control being of special design.

One of the chief advantages of the commercial delivery car is the recuperating feature. On half voltage or with the controller lever in the low speed position, the battery begins to recharge at a vehicle speed of 10-11 m.p.h. and on full voltage it begins to recuperate at 19 to 20 m.p.h. The advantages resulting from the comparatively flat motor characteristic (see Fig. 2) and the recuperating action are summarized by Steinmetz as follows:

(a) The speed is well maintained on heavy up grades and with heavy loads.

(b) A quicker and less sluggish getaway in starting.

(c) On level and slight down grades the maximum speed is limited, so that a careless driver cannot race the car.

(d) On down grades (and in stopping) the motor automatically becomes a generator, acts as brake and feeds electric current back into the battery; therefore, the car is perfectly safe when on heavy down grades, as the motor checks the speed on down grades, and holds it down to a safe limit. Incidently, this saves wear of the brakes, as the brakes never need to be used except to come to a dead stop. This results in a better maintenance of the car mileage in hilly territory.

(e) Much of the power wasted in the motor field at large currents, is saved, thus increasing the mileage.

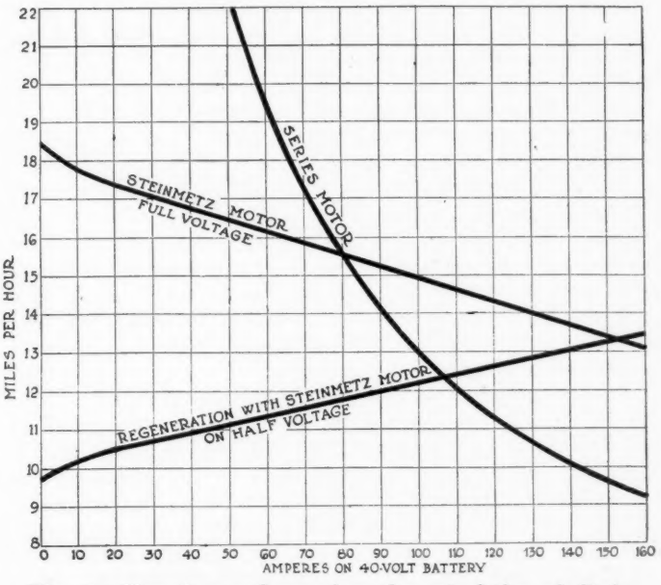


Fig. 2—Charging and running characteristics of Steinmetz motor compared with characteristics of series motor

Increase in Draft with Speed in Tractor Plowing

AT a recent meeting of the American Society of Agricultural Engineers Prof. J. B. Davidson of Iowa State University presented a paper on "The Influence of Speed on the Draft of a Plow." This was based on a series of dynamometer tests made with a Cleveland tractor and a P. & O. Little Genius power lift gang plow at the University Farm of the California College of Agriculture and with a Moline Universal tractor and Grand Detour plow on the University experimental plots at Ames, Iowa. Following are the conclusions drawn by Prof. Davidson from the results of these tests:

1. An increase in the field speed from 2 to 3 miles per hour of a plow with a general-purpose moldboard will result in an increase of the draft of from 8 to 12 per cent varying with the soil. Doubling the speed will result in an increase of draft of from 16 to 25 per cent. The amount of work accomplished is increased 50 and 100 per cent, respectively.

2. The furrows are laid more smoothly and the furrow slices better pulverized at the higher speeds.

3. There are no inherent difficulties in plowing stubble ground in good condition for plowing at a speed of four miles per hour.

4. It is quite clear from observations made during the tests that plows could be operated at even higher speeds if the plows were specially designed for such speeds.

It appears to us that it should have been added under 1 that when the speed of plowing is increased 50 per cent and the rate of doing work the same, while the draft increases only 8 to 12 per cent, the power required increases 62 to 68 per cent, so that the power required increases faster than the work done. Similarly when the speed and rate of doing work are doubled, while the draft increases only 16 to 25 per cent, the power required increases 132 to 150 per cent.

Braking on All Four Wheels

In this careful analysis, based upon engineering practice and theory. Mr. Bradley predicts the general use of a front braking system. European use is contrasted with that of American makers, and a notable article is the result.

By W. F. Bradley

FORE wheel brakes are a feature of the high-grade cars now being produced or designed by European, and particularly by French automobile manufacturers. The makers who are braking on all four wheels are Delage, Hispano-Suiza, Piccard-Pictet, Excelsior, Isotta-Fraschini, Bellanger, Elizalde and Darracq. This list will be extended before the end of the year, as other firms have decided to fit fore-wheel brakes, although not yet prepared to make a public announcement on this point.

Brakes on the front wheels are not new. They made their appearance at the London show of 1908, and for several years were used by the Isotta-Fraschini company in Italy and by the Argyll company in England. The latter firm went out of existence, but the Isotta-Fraschini company continued to use front wheel brakes on their more powerful types of cars. Defects were discovered in some of the early systems and they failed to make immediate headway.

The revival began just before the outbreak of war, when front wheel brakes made their appearance on racing cars, being used by Delage, Peugeot, and Fiat. In this supreme test, they proved efficient. All fears that they would interfere with steering proved unfounded. Such brakes added to the average speed of a car on the road and their value was so conclusively proved that it is doubtful if, in the future, any road racing machine will be built without a system of this kind. The Ballot cars—the only European racing machines produced since the armistice—were designed to receive front wheel brakes, and although these were not used on the track, they were fitted to the cars when they took part in road races.

This racing experience, combined with experiments carried out during the war, convinced a small number of the leading makers that standard cars should be fitted with brakes on all four wheels. If more did not make this adoption, it is because of lack of time and not because of any defects in the leading systems or any fears as to the valve of this braking arrangement.

Year by year, the maximum speed of automobiles has increased, but braking power has not adequately kept pace with this growth in speed. The average speed of an automobile on give-and-take roads depends on a number

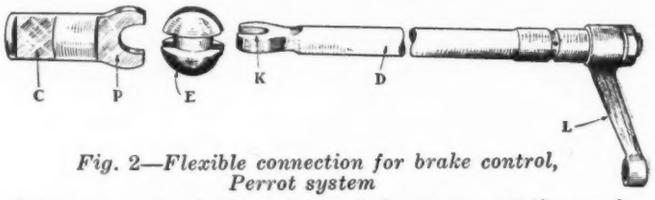


Fig. 2—Flexible connection for brake control, Perrot system

of factors, quite independent of the power of the engine. Among these are the general suspension of the car, the state of the road surface, the amount of traffic on the road and the speed with which the car can be pulled up and accelerated. Engines, carbureters and chassis details have received close attention with a view to obtaining rapid acceleration, but comparatively little attention has been paid to braking systems as an aid to a higher average speed. It has been proved, however, without any possibility of doubt, that, of two cars identical in every respect but the brakes, the one with front wheel brakes will be several miles an hour faster on an average road than the machine with the usual transmission or rear wheel brakes.

In Europe, the tendency has been to increase the braking era and to place both sets of brakes on the rear wheel drums. This follows American practice but with a great improvement over all American machines. While the brakes on European cars may not be all that can be desired, it is recognized that they are decidedly better than those on the average American machine.

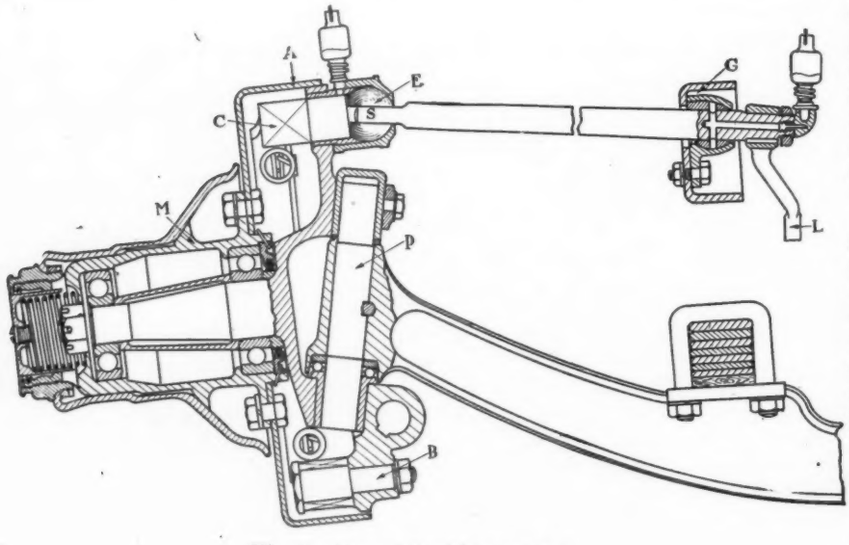
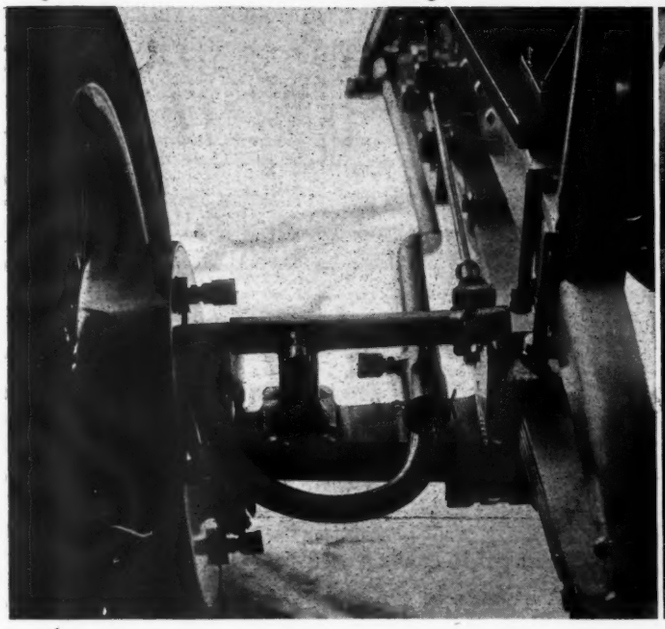


Fig. 1—Perrot braking system

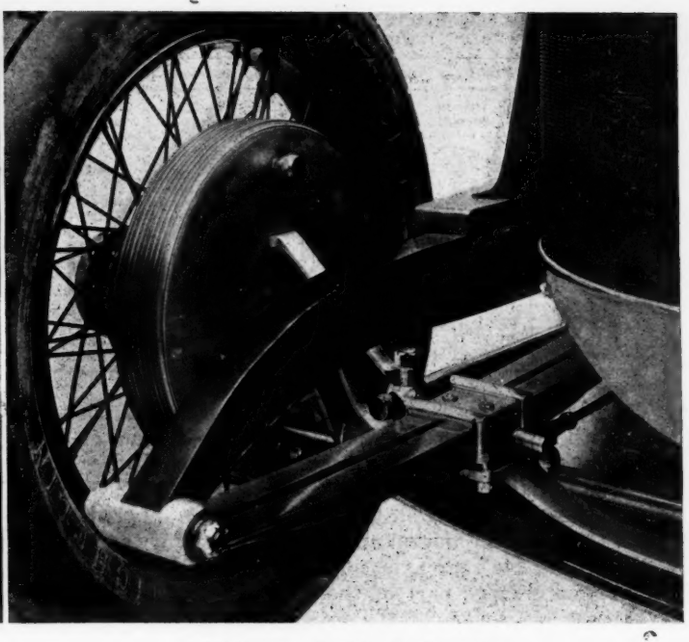
Theory of Braking Power

The great disadvantage of the transmission brake, mounted on the rear of the gearbox, is that all the braking effort has to be taken through the differential and through the universal joints. As the braking effort is often twice that developed by the engine, the transmission has to be designed for this effort, which naturally tends toward a heavier chassis construction throughout. On the other hand, the transmission brake gives a quick stop impossible to obtain with brakes on the rear wheels only.

The braking of a car, or, in other words, the absorption of the energy of the moving



Elizalde front wheel brake. This is a Spanish production



Bellanger front wheel brake

mass, is obtained in practically all cases by means of friction between the brake-shoes and the drums with which they are brought into contact.

The energy of the moving mass is equal to half the product of the mass multiplied by the square of the velocity:

$$E = \frac{1}{2} m v^2$$

If, therefore, the weight of the car in kilograms is represented by P, the speed in kilometers per hour by V, and Q the energy in kilogram meters, we obtain:

$$Q = \frac{1}{2} \times \frac{P}{9.81} \times \left(\frac{V}{3.600}\right)^2 = 0.00393\, PV^2$$

Indicating by p the load on the wheels receiving the braking effort and by f_a the coefficient of adherence, the total retarding effort, F, is determined by the inequality

$$F < f_a p$$

The distance covered during the braking effort is L. The total braking work, expressed in kilogrammeters

$$= F L$$

It has been shown that the energy of the moving mass is:

$$E = 0.00393\, PV^2$$

We thus obtain:

$$F L = Q = 0.00393\, PV^2$$

from which

$$L = 0.00393 \frac{PV^2}{F}$$

Application of the brakes produces a negative acceleration:

$$j = \frac{F}{m} = \frac{9.81 F}{P}$$

The time in seconds necessary to obtain a stop is

$$t = \frac{v}{j} = \frac{V}{3.600 j} = \frac{V \times P}{3.6 \times 9.81 \times F} = 0.0283 \frac{VP}{F}$$

The values in the accompanying table have been obtained by taking

P = Total weight of the car = 1500 kilos (3306 pounds)

p = Load on the braked wheels = 3/5 P for the rear wheels, which are the only ones braked = 900 kilos

$p = P$ for four wheels brakes = 1500 kilos

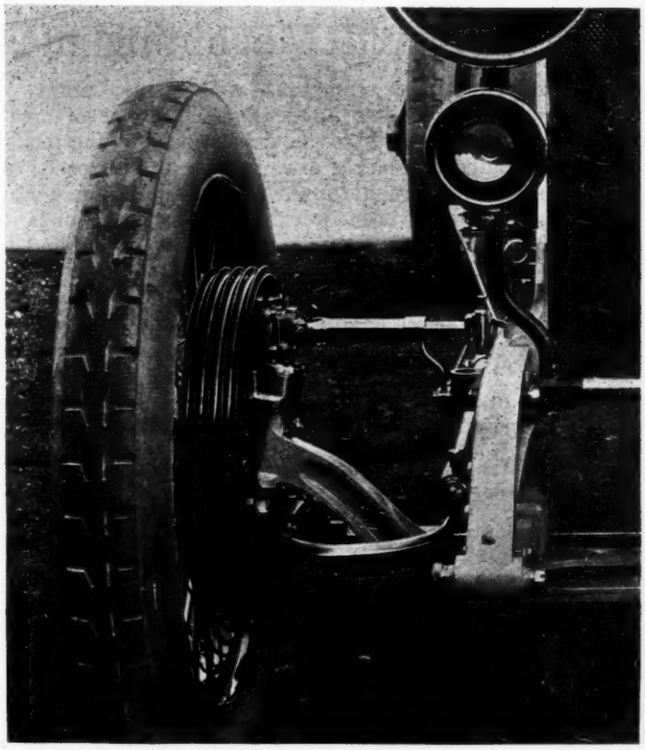
$f_a = 0.60$

$F < f_a p$, or $0.60 \times 900 = 540$ (rear wheels only braked)

$0.60 \times 1500 = 900$ (all wheels braked)

$$j = \frac{F}{m} \frac{9.81 \times 540}{1500} = 3.47$$

$$j = \frac{9.81 \times 900}{1500} = 5.88$$



Hispano-Suiza front wheel brake

TIME AND DISTANCE REQUIRED TO STOP WITH REAR WHEEL AND WITH FOUR-WHEEL BRAKES

Speed in Miles per Hour	With Rear Wheel Brakes Only		With Four Wheel Brakes	
	Time in Seconds	Distance Covered in Feet	Time in Seconds	Distance Covered in Feet
6.2	0.78	3.55	0.47	2.1
12.4	1.56	14.20	0.94	8.2
18.6	2.34	32.00	1.41	18.2
24.8	3.12	57.00	1.88	34.2
31.0	3.90	89.00	2.35	53.4
37.0	4.68	128.60	2.82	76.0
43.0	5.46	175.00	3.29	104.0
49.0	6.24	228.70	3.76	136.8
56.0	7.02	289.60	4.23	173.2
62.0	7.80	357.60	4.70	213.0
68.0	8.58	432.60	5.17	258.8
74.5	9.36	514.80	5.64	307.9
80.0	10.14	604.00	6.11	360.9
87.0	10.92	700.80	6.58	419.0

The above figures have been obtained on the supposition that with brakes on the rear wheels, the load on the braked wheels remains constant. This is not the case, however. A touring car with its full load of passengers is more heavily loaded on the rear axle than on the front. When the car is in motion an important part of the weight is thrown on the rear axle, but as soon as the rear brakes are applied a large part of the load is transferred to the front axle by reason of the brake reaction, and the load on the front wheels often exceeds that on the rear. As a consequence the effect of the rear brakes is diminished, while that of the front is increased.

Experiments carried out in England by John V. Pugh have given the following results:

The car had a wheelbase equal to 3½ wheel diameters (3.080 m. for wheels of 880) and the distance of the center of gravity from the ground was equal to the diameter of the wheels; the coefficient of friction between the wheels and the road is taken as equal to 0.625.

Mr. Pugh has calculated the angle of the gradient on which the car would not slide with the front or the rear wheel brakes locked or the two locked simultaneously. These results are given in the accompanying table.

HOLDING POWER OF FRONT, REAR AND FOUR-WHEEL BRAKES

	Maximum Angle of Gradient on which Car will not Slide	Retarding Effort of Front Wheel Brakes	Weight on Front Wheels	Retarding Effort of Rear Wheel Brakes	Weight on Rear Wheels	Total Retarding Effort
CENTER OF GRAVITY ONE-THIRD OF WHEELBASE, BEHIND FRONT WHEEL						
No brake held	.....	.....	0.665	.....	0.333	.....
Front brakes only	27.00°	0.505	0.820	.....	0.180	0.514
Rear brakes only	10.00°	.....	0.718	0.177	0.282	0.180
Four wheel brakes	32.00°	0.528	0.852	0.097	0.148	0.625
CENTER OF GRAVITY AT MIDDLE OF WHEELBASE						
No brake held	.....	.....	0.500	.....	0.500	.....
Front brakes only	20.75°	0.379	0.610	.....	0.390	0.379
Rear brakes only	14.75°	.....	0.575	0.265	0.425	0.262
Four wheel brakes	32.00°	0.423	0.680	0.202	0.320	0.625
CENTER OF GRAVITY TWO-THIRDS OF WHEELBASE BEHIND FRONT WHEELS						
No brake held	.....	.....	0.333	.....	0.666	.....
Front brakes only	14.00°	0.252	0.400	.....	0.600	0.250
Rear brakes only	19.50°	.....	0.432	0.355	0.568	0.355
Four wheel brakes	32.00°	0.319	0.512	0.306	0.488	0.625

Time in seconds (with four wheel brakes)

$$L = \frac{0.00393 \times 1500 \times V^2}{540}$$

Time in seconds (with rear wheel brakes)

$$L = \frac{0.00393 \times 1500 \times V^2}{900}$$

Distance covered (with four wheel brakes)

$$t = \frac{0.0283\ V \times 1500}{500}$$

Distance covered (with rear wheel brakes)

$$t = \frac{0.0283\ V \times 1500}{900}$$

THE *Journal of Commerce* announces that the Marche du Monde, a rendezvous of producers and buyers of the world, costing $20,000,000, and containing every appurtenance from 5000 shops to legal and customs departments, will be built in Paris.

Rapid Machining of Multi-Cylinder Camshafts

ON a multi-cylinder camshaft with either eight or twelve cams there are a very large number of small turning and facing cuts to be taken and production is slow unless multi-tool lathes are used for the purpose. A special method of camshaft machining by means of a Fay automatic lathe has been worked out by the Jones & Lamson Machine Co. and is described here as applied to four cylinder camshafts.

Starting with the rough forging, the first operation, as illustrated in Fig. 1, consists in milling the ends of the forging to length, gaging from the central bearing. The forging is clamped in V-blocks at the two end bearings. A second fixture can be used on the opposite side of the cutter arbor so that one forging is being put in place while another is being worked on, thus increasing the output.

The second operation consists in centering the ends to a standard depth. This is done in an ordinary centering machine, as shown in Fig. 2, rigged with a stop against which the finished end of the forging is set. A stop collar on the drill spindle limits the depth. A machine has recently been placed on the market in which both ends of the forging can be drilled simultaneously.

Fig. 3 shows a limit gage of the "flush" type for inspecting the depth of the drilling for the headstock center. If the depth is kept within limits the work can be put in and out of the lathes and grinding machines with confidence that all shoulders will finish properly.

The third operation consists in rough turning or grinding the three large diameter bearings to a tolerance of 0.003 to 0.005 in. This is a simple operation, and is done to furnish driving and back-resting surfaces for turning and grinding.

The fourth operation is shown in Fig. 4. The work is mounted in the Fay automatic lathe, with the middle bearing supported in a steady rest. The rear tools rock in and square up the shoulders shown. The front tools feed in to depth, turn the required shoulder distance, and then withdraw and return to the starting point. These motions are all effected automatically, and the machine stops itself at the conclusion of the cut. In this operation eighteen tools are at work at the same time.

The fifth operation, similar to the preceding one, is shown in Fig. 5. Besides squaring up and turning between the remaining cam lobes, the timing gear seats are given a second or finish turning and certain corners are beveled.

This finishes the lathe work on the forging, leaving it ready for keyseating, oil grooving, and finish cylindrical and cam grinding by standard methods.

THE *Philadelphia Public Ledger* states that J. H. Williams, at meeting of British Institute of Marine Engineers at Minories, said that Americans are far ahead of the British in the use of oil as fuel for ships.

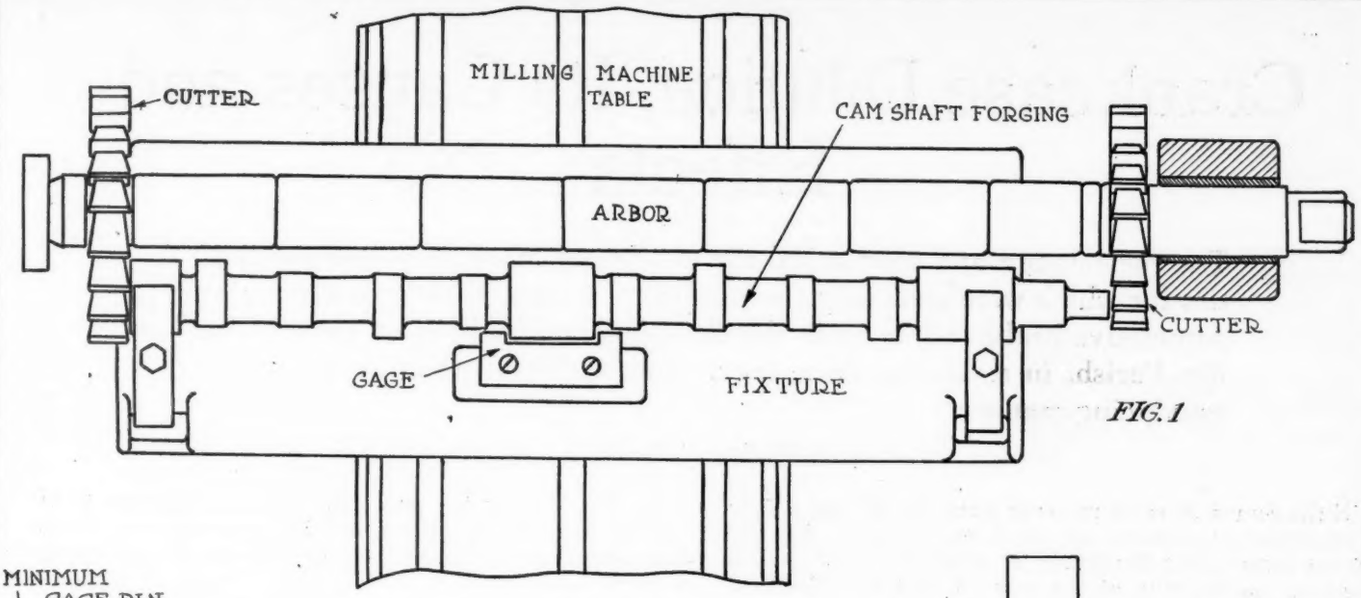


FIG. 1

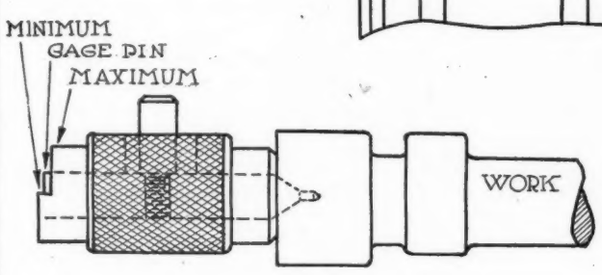


FIG. 3

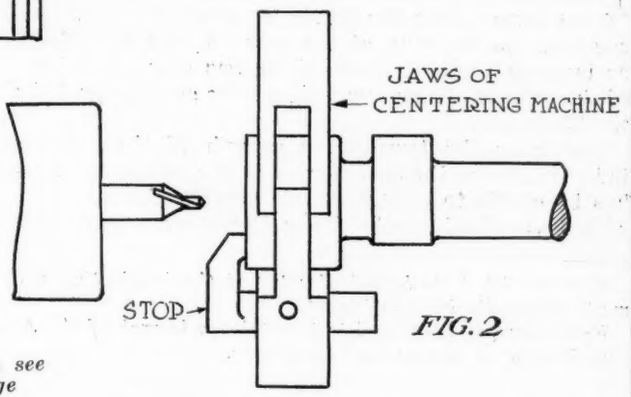


FIG. 2

For description see preceding page

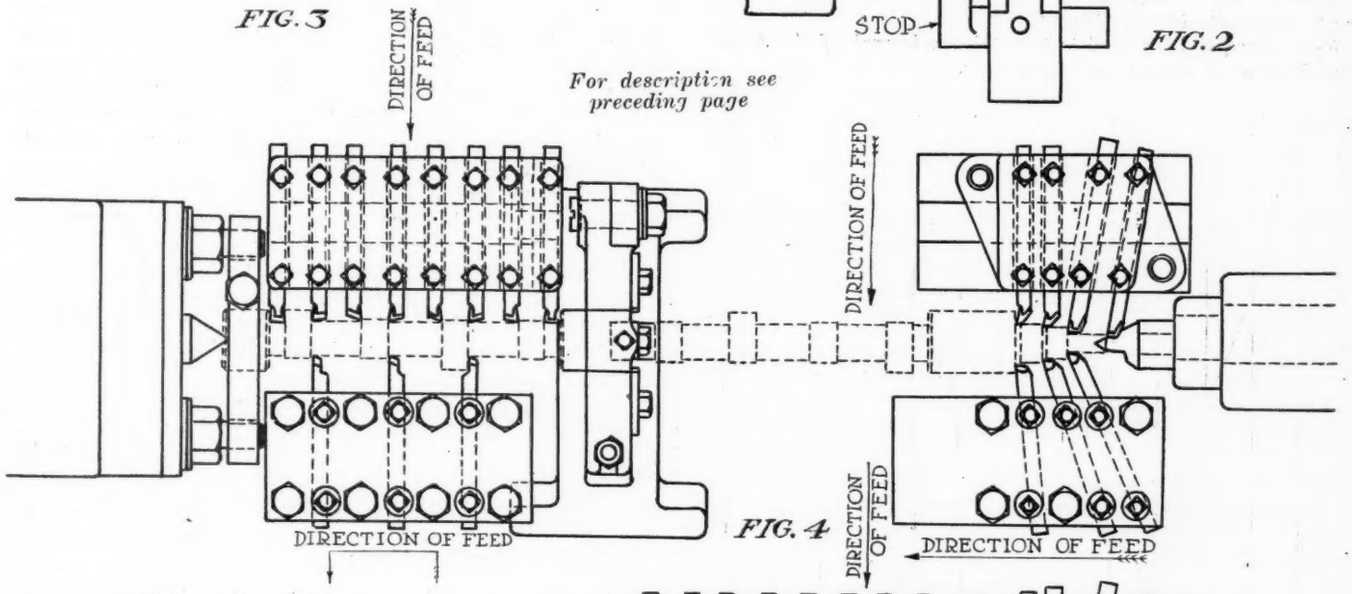


FIG. 4

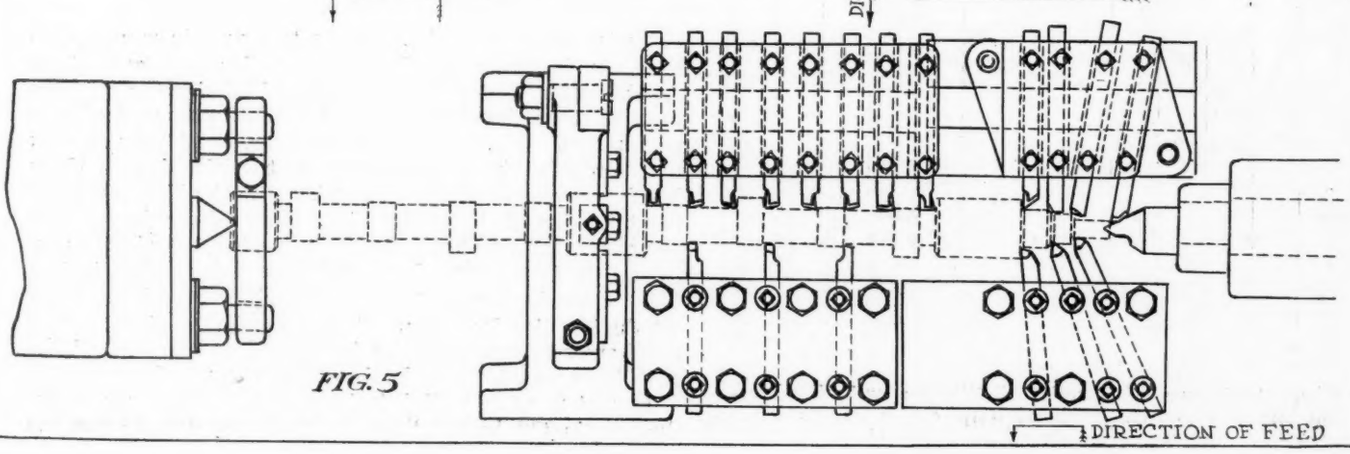


FIG. 5

Crankcase Dilution, Its Causes and Effects

The reclamation and economical use of oils and lubricants—the possibilities for which were shown by the results of several tests—constitutes an automotive problem that faces the designers and builders of gas engines. Mr. Parish, in reviewing these tests, sums up the facts in a careful and convincing manner

By William F. Parish*

IN the course of some research work in 1911 on a four-cylinder automotive engine, it was noticed that the oil drawn from the crankcase after use had less than one-half the viscosity of the new oil, and that the flash or ignition point of the used oil was only one-third that of the original, being lowered in some cases from 470 deg. to 150 deg. F.

Owing to the tremendous growth of the automotive industry during the past few years, the petroleum industry has been able to meet demands only by the manufacture of a less volatile fuel. Navy Department specifications show that, during the past few years, automotive fuels have been gradually getting heavier, approximately from 360 deg. F. end point in 1916 to 428 deg. F. end point in 1919.

During the war it was necessary, before writing specifications for lubricating oils and fuels for aeronautic and other internal combustion engines, to make a complete study of this subject in order that the fuel and lubricants could be so balanced that their combination in the engine would give the necessary lubricating results. These main tests resulted in the specification for Liberty Aero oil, and had much to do with specifications for aviation gasoline, including domestic, export and fighting grades. A Hall-Scott, type A-7-A, four-cylinder, 100 hp. aircraft engine was used for the special fuel tests, working with the same lubricant but with different fuels. Two of these fuels were especially made for the tests and were distilled from the same crude. The first fuel tested was made after the German specifications for aviation gasoline and had a gravity of 75.2 deg. Be., with initial boiling point of 110 deg. F. and a final boiling point of 230 deg. F. The second fuel tested was made after the French specifications and had a gravity of 63.6 deg. Be., an initial boiling point of 140 deg. F. and a final boiling point of 292 deg. F. The third fuel was regular navy specification motor boat fuel under contract for the year 1917. It had a gravity of 61.3 deg. Be., with an initial boiling point of 135 deg. F. and a final boiling point of 385 deg. F. To the last fuel, a so-called gasoline energizer was added which produced a fuel which, while it had an initial boiling point of 135 deg. F., had an end point of 422 deg. F. In its last distillation range, this would be equivalent to the present-day commercial gasoline.

Mr. Parish is technical director of the lubricating department of the Sinclair Refining Co.

From a paper presented to the Chicago branch of the American Society of Mechanical Engineers.

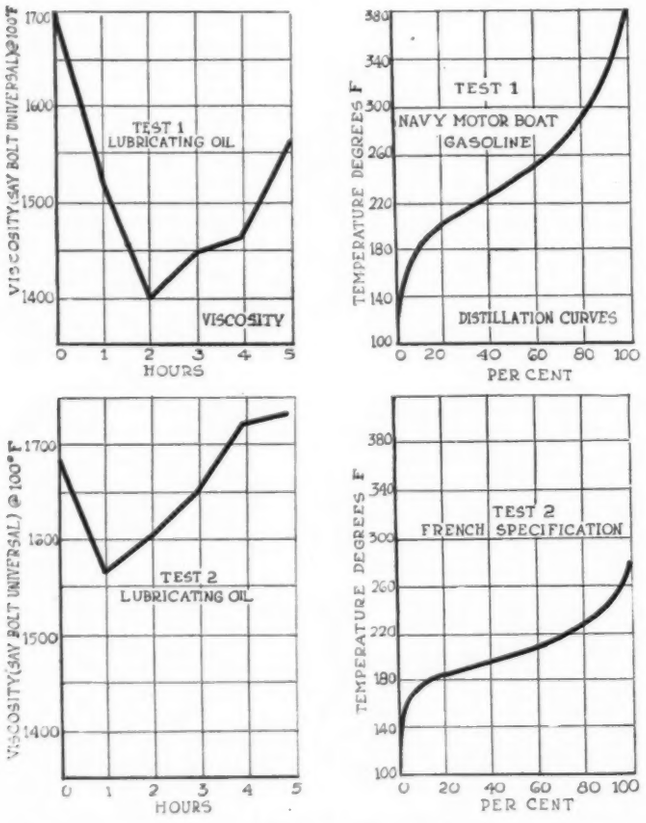


Chart 1—Curves of gasoline distillation and oil viscosity, showing change of lubricating oil in engine while in operation—(Hall Scott A-7-A)

Method of Conducting Tests

The method of conducting the test was to run the engine continuously for five hours under rest conditions. At the end of every hour samples of lubricating oil were drained from the crankcase and the same amount of new oil replaced. These samples were examined by the Bureau of Standards, the oil laboratory of the Washington Navy Yard, two commercial laboratories, and the Naval Experiment Station at Annapolis. The effect of the four different classes of fuel upon the same lubricant is clearly registered in Charts 1 and 2. The most volatile fuel in test No. 3 caused a lowering of the viscosity of the lubricating oil during the first hour of 30 seconds (Saybolt). The oil, however, recovered its body, and at the end of the fifth hour was 44 seconds above its original viscosity.

In test 2, with a slightly heavier fuel, there was a reduction in the body of the oil of 46 seconds during the

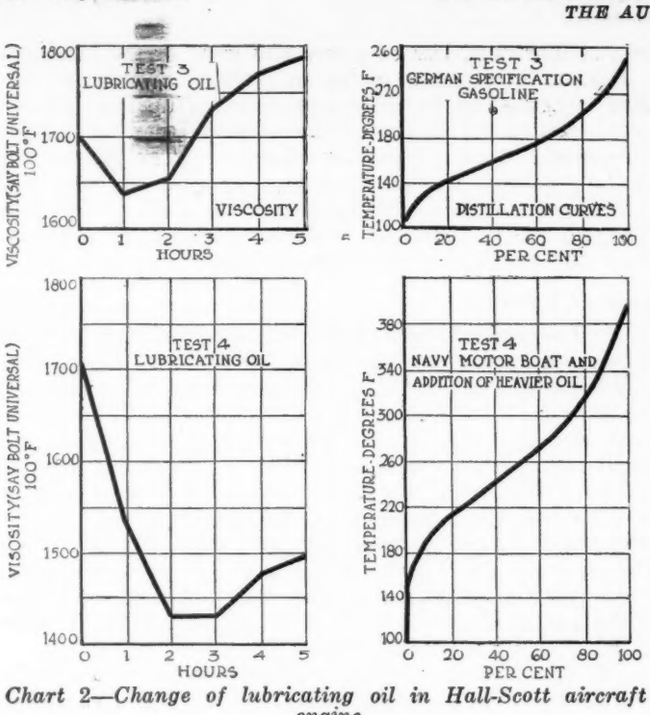


Chart 2—Change of lubricating oil in Hall-Scott aircraft engine

first hour and a recovery of 28 seconds above its original body at the end of the fifth hour.

Test No. 1, with a semi-commercial fuel, showed a drop in the body of the oil in two hours of 150 seconds, with a slight recovery during the balance of the test. There was a total reduction of 16 seconds at the end of five hours.

In test 4, with the high end point gasoline, there was a drop in two hours of 142 seconds, only a slight recovery and a total drop at the end of five hours of 108 seconds.

The samples taken at the end of all five-hour periods were tested in a distillation flask and the amount of heavy gasoline recovered varied from 0.4 per cent to 1.2 per cent, as indicated in Chart 3. All of the physical characteristics of the oil showed a considerable change.

The results indicate quite clearly that dilution exists with even the most volatile fuel, but only during certain periods of the operation of the engine and under certain fixed conditions. With the most volatile fuel and with producer, natural or furnace gas, the tendency of the lubricating oil would be to build up in body, the same as in any other class of lubrication work where the lubricant does not come in contact with lighter hydrocarbons. The above tests also indicated quite clearly that the heavier the end point of the fuel, the greater and more permanent is the effect of dilution.

In the experiments, the aeronautic engine was operated with an exceedingly heavy lubricating oil, such as these engines require, and carbureter and magneto adjustments were attended to by experts. The engine was placed in perfect condition for the test and operated continuously without stopping, at high speed, for the entire five hours.

Tests on Truck Engines

The following data was secured from a considerable number of cars and trucks examined during December, 1919, using gasoline and lubricants purchased in the Chicago market. Some of the cars were new, others old, and some had been repaired.

After the motor was first thoroughly cleared, the crankcase was filled with the oil to be tested, these oils covering a range of commercial medium and heavy grades conforming to Government specifications. The cars were operated in their regular business for periods of ten days, and, at the end of each two-day period, an eight-ounce sample would be drawn from each crankcase and eight ounces of the same oil used on that particular motor would be put in with whatever additional oil was necessary. The samples were examined for dilution by measuring all the product that could be distilled from the sample of oil under 500 deg. F. The viscosity of the sample before removal of the diluent was taken on a Saybolt viscosimeter at 100 deg. F. The method of making the ash test was to first test the oil in the Conradson carbon apparatus. After the carbon was determined, a gas flame was used for burning the carbon out of the dish. The ash that remained was then weighed and the percentage of the whole sample taken. This ash was made up of iron, iron oxide and silica.

Chart 4 is from a new Diamond T 3½-ton truck engine which had never been run previous to this test. Viscosity at the end of ten days was reduced from 345 to 100 seconds. Dilution on the tenth day amounted to 19 per cent and ash, 1.62 per cent.

Chart 5 is of a 5-ton Pierce-Arrow truck that had run 5202 miles. On July 4, 1919, this motor was completely overhauled, new piston rings being fitted. Viscosity dropped from 358 to 90 seconds during the first six days, then recovered to 184 seconds at the end of ten days. Dilution in the case of this truck seemed to be dependent upon weather conditions; at the end of the 6-day period there was 20.6 per cent of dilution, but this was reduced to 8 per cent at the end of the 10-day period.

Chart 6 is of a 3½-ton Packard truck that had run 12,551 miles and was overhauled May 5, 1919, having new rings fitted. (This truck did not go out of the garage for the first two days. The engine, however, was run during this time for a period that would be equivalent to five miles' operation.) The viscosity held practically constant for the first two days when the truck was not operating in the open. After the second day there was a drop in viscosity to 43 seconds. Dilution at the end of the tenth day was 26.5 per cent.

Cause of Dilution

With the present-day fuel and the present-day automotive engine, all lubricants change considerably in body within a short operating period, owing to dilution coming from the heavy end of the fuel. The amount of dilution is largely influenced by the temperature of the surrounding air; the cooler the oil in the engine, the greater the amount of fuel it will absorb and hold. Conversely, the hotter the air or lubricating oil, the less the amount of fuel held in dilution, as all the fuel can be distilled off at high temperature.

In order to see if any of the dilution of a motor-oil could be caused by decomposition or cracking of the oil by being thrown against hot surfaces, tests were made by the author with a commercial car operated by pure benzol.

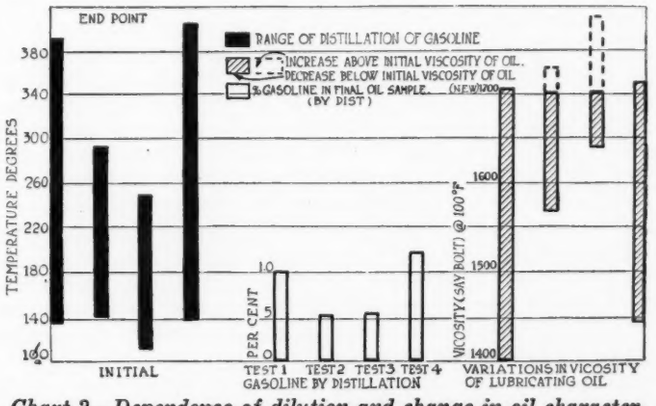


Chart 3—Dependence of dilution and change in oil characteristics upon quality of gasoline

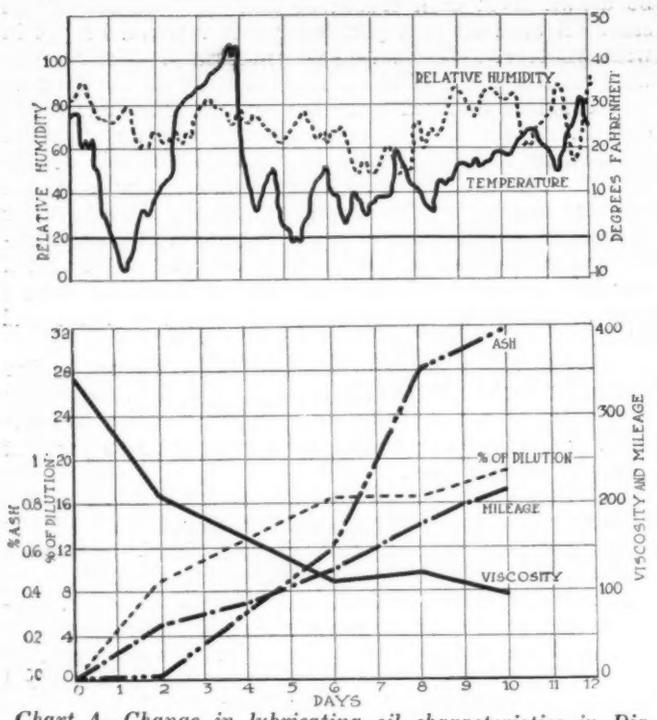


Chart 4—Change in lubricating oil characteristics in Diamond T truck engine

From 4 to 8 per cent of benzol was distilled from the motor oil after 100 mile runs. The oil, after the benzol had been removed, possessed all of its original characteristics.

The conclusions drawn from the above test with benzol are confirmed by the results of a test on a Nash six-cylinder engine operated for ten hours with city gas. The original viscosity of the oil at 100 deg. F. was 205 seconds; after ten hours' operation the viscosity had increased to 255 seconds, the flash and fire points remaining practically the same, showing that there had been no change in the oil caused by cracking and reabsorption of the lighter products, but that the absence of lighter products allowed the oil to become heavier in body.

The losses caused by dilution are of four kinds:

1. Loss of fuel.
2. Loss of power.
3. Wear of all parts.
4. Loss of lubricant.

Loss of Fuel

Irrespective of the nature of fuel, whether light or heavy, there will be a fuel loss during the compression stroke in a four-cycle engine. In the case of heavy end fuel, this loss is reflected in increased dilution of the lubricating oil. In the case of a light fuel, say one of 72 deg. Baumé, the loss by the rings during the compression stroke would be just as pronounced, supposing the sealing effect of the lubricant on the piston rings to be always the same, but the effect would not be as noticeable, due to the lubricant's inability to absorb and hold the lighter fuel as a diluent at operating temperatures.

The fuel loss is not accurately represented by the amount of dilution found in motor oils, as there is a point of saturation of a motor oil dependent upon the condition under which it is operating. The fuel working past the piston is disposed of by the engine in some other way than by absorption in the lubricant.

The first effect of dilution upon the lubricating oil is to reduce the viscosity to a point where the oil cannot be considered an efficient lubricant for a motor. This causes loss of lubricant, loss of power and wear of the machine.

Loss of lubricating oil in an internal combustion engine is caused by the lubricant creeping up the cylinder walls, mainly during the admission stroke, and being later consumed in the combustion chamber. The lighter the oil, the greater this loss will be. Another loss is due to the removal of lubricating oil from the engine at periods of from 300 to 800 miles (only one-half the former mileage) the mixture being thrown away.

Loss of Power

If a machine is lubricated with oil of the proper viscosity, the power required to run it will be at a minimum and there will be practically no wear on the bearings. If, however, an oil of unduly high viscosity is used as a lubricant, the power necessary to move the machine at the same speed will increase materially owing to the greater fluid friction of the lubricant. Under this condition there will be practically no wear, as the surfaces will be kept well apart. When running the same machine with an oil that is too light in body, it will require as much or even more power than with the extra heavy oil, the resistance being due to metallic or solid friction, one of the results of which is abrasion and wear.

The effects of dilution are well illustrated by a test on a tractor engine using kerosene for fuel. At the start of the test the brake horsepower was 28. It gradually dropped to 24.5 in eight hours, indicating a considerable increase in the frictional horsepower. The oil viscosity (Saybolt), at 100 deg. F., changed from 300 seconds at the start to 75 seconds at the finish of the test, at which time there was 36 per cent of dilution in the oil. The temperature of the oil in the crankcase increased from 98 deg. F. at the start to 135 deg. F. at the end of the run.

A lubricant in a motor at working temperature should have a body at least equal to that possessed by a new heavy spindle oil (130 seconds viscosity at 100 deg. F.) and an oil of such light body must be used in a force feed system where the pressure and constant flow of the oil will make up for the lack of body. As a matter of fact, most motor oils, when in an engine are much lighter than a lubrication engineer would apply to the lightest piece of machinery, for instance, a light spindle in a textile mill. These spindles rotate at about 10,000 r.p.m. and the side

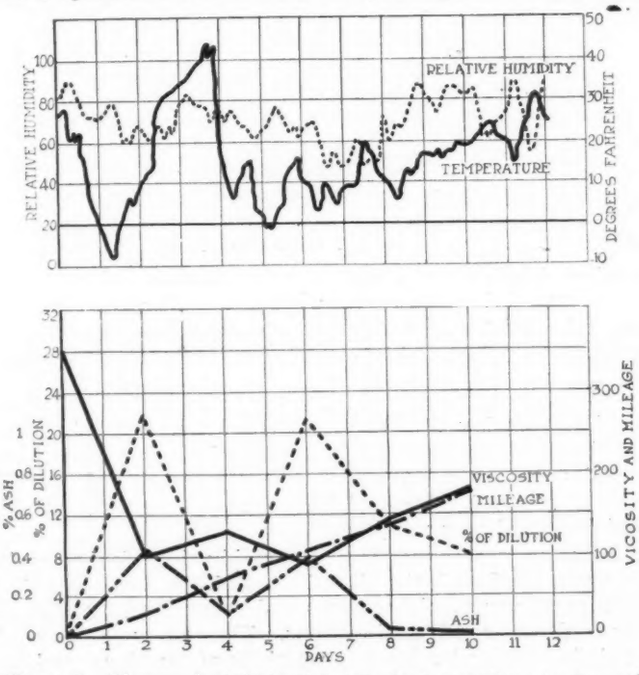


Chart 5—Change in lubricating oil characteristics in Pierce-Arrow 5-ton truck engine

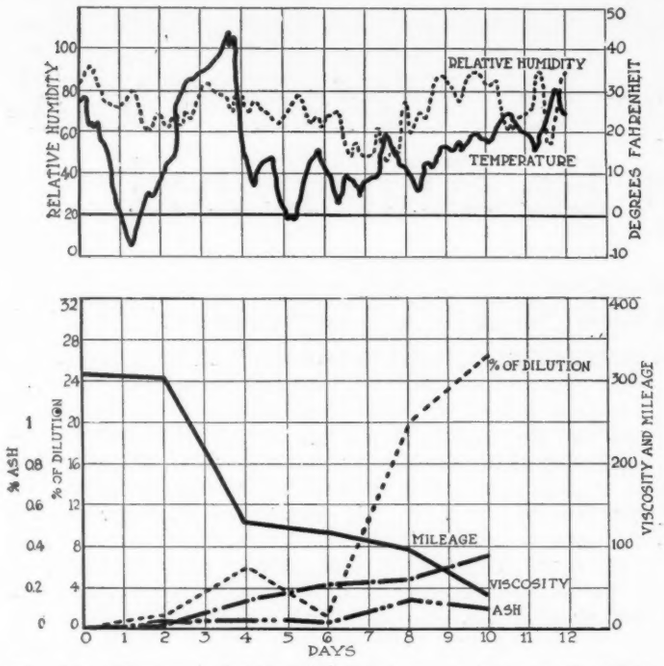


Chart 6—Change in lubricating oil characteristics in Packard 3½-ton truck engine

pull averages 2 lb. The pressure on the bearing side will not be above 10 lb. per sq. in. The high rotative speed of the spindle tends to keep it away from the bearing surface and in the center of the bolster. About one ounce of oil is placed in the base of the spindle, this amount being increased every 15 to 45 days. It has been proved that oil that has a viscosity of less than 60 seconds at 100 deg. F., Saybolt Universal, will allow these spindles to wear perceptibly in a month's time. The oil remaining in the spindle base will become black and contain a considerable proportion of iron and iron oxide. The same spindles, when lubricated with oil of from 70 to 80 seconds viscosity, do not wear because this oil has sufficient body to keep the surfaces apart.

Lubrication of an engine with a mixture of lubricating oil and the heavy end of the gasoline, having a viscosity below that required for a textile spindle, can only result in excessive wear. This is shown by the ash remaining after distillation of a sample from the crankcase.

Wear of Machine

The effect of poor lubrication is indicated to some extent by the ash readings. These readings were taken on each sample and represent the total amount of ash in that particular sample. The ash is made up of oxide of iron, other metal and of silica, the iron and other metal being from natural or unnatural wear of the engine, the oxide of iron coming from the water that has been in contact with the metal and the silica from road dust, although, at the time of the year this particular test was made, the streets were well covered with snow and but little road dust could be expected to enter the engine through the carbureter or breather.

Conclusion and Recommendations

As engineers we are now faced with a definite problem. Little can be done by the oil industry to improve the fuel situation, but considerable can be done in regard to the application of motor oil. In the past a motor of given manufacture was supposed to require a certain grade of lubricant for its entire life. Modern lubrication engineering bases its selection of a proper oil upon more scientific or practical grounds. The automotive designing engineer must provide means for entirely consuming the fuel on top of the pistons. Effecting compression of the mixture outside of the cylinder and igniting the charge upon admission during the power stroke would obviate practically all leakage that takes place during the compression stroke of the present four-cycle motor. Other methods undoubtedly will be proposed and worked out successfully as soon as the seriousness of the present situation is fully established.

Conservation of Lubricating Oil and Fuel

In the Air Service, during the war, there was need for the conservation of lubricating oil and a simple system of reclamation was designed and installed at the 30 flying fields in this country. This brought about a considerable saving in oil and money. The records show that 40 per cent of the oil issued and used in the aircraft engines was sent back to the reclaimers, and of that amount 73 per cent (and as high as 95 per cent) was reclaimed and made available for re-use. Moreover, the test records show that this reclaimed oil was a better lubricant than the original oil, the engine being cleaner after using the reclaimed oil. Half of the field flying engineers stated that the reclaimed oil was preferred to new oil; the other half said it was just as good as new.

Oil reclaimers are commercially successful. It is only necessary to have steam for their operation. They should be installed in every commercial garage. Reclamation of motor oil can be carried on without trouble and at a cost not exceeding 10 cents a gallon. The oil so reclaimed will be just as good a lubricant as new oil, but will be dark in color and have a slightly burnt odor. Removal of this color and odor would require expensive and elaborate equipment and is not at all necessary.

Where reclaimers are installed, oil should be removed every day. Motors should be made with larger drains and should permit of easy draining and filling. In fact, it should be as easy to drain and fill a motor with lubricating oil as it is to fill the radiator with water or the tubes with air.

Devices for removing the fuel admixture from the crankcase oil do not solve the main problem of economy of gasoline. The solution must come through some entirely different method of handling the fuel.

Study of Airplane Engine Tests

THE National Advisory Committee for Aeronautics, Washington, has just issued Report No. 46, "A Study of Airplane Engine Tests." It embodies deductions drawn from results of many tests made upon one engine in the altitude laboratory of the Bureau of Standards.

Three major variables are considered; namely, speed, altitude and power, as well as other variables such as heat distribution, friction losses, carburetion, etc.

The work shows that:

Power varies approximately with the density of the air, decreasing with altitude. The heat supplied in the fuel should be proportional to the density of the air, up to nearly 15,000 ft. altitude, above this altitude a richer mixture should be supplied. The thermal efficiency based on brake power is a variable, but when based on the indicated power it is nearly a constant for all speeds and altitudes. The sensible heat in the exhaust varies somewhat, but is closely related to the heat rejected on the theoretical (Otto) cycle. The pounds of fuel per I. h.p. per hour is constant up to nearly 15,000 ft. altitude, but increases at the higher altitudes as a richer mixture is required. When fuel consumption is based on B. h.p., it steadily rises with decrease of density, owing to the effect of a nearly constant friction loss at a given speed.

Commercial Bribery Is Unfair Competition and Must Be Eliminated

A member of the Federal Trade Commission condemns the practice of making lavish gifts for unfair influencing of business, and he points out methods to stop the practice. He also asks for a Federal "blue-sky" law

THE practice of "commercial bribery" came in for some very sharp criticism recently, when William B. Colver, a member of the Federal Trade Commission, spoke to the Purchasing Agents Association of New York. The unjustifiable practice of some salesmen in attempting to influence purchasing agents by lavish entertainments, large personal gifts, etc., is well known and unfavorably looked upon in the automobile trade. Mr. Colver pointed out the evils of the practice, stated the definition of commercial bribery which is used by the Federal Trade Commission and showed how that body was working out its policy.

He also touched upon several other topics of interest to automobile manufacturers during the course of his address. He told of the efforts of the Commission to obtain an effective "blue-sky" law. A portion of his address will be of particular interest and is given herewith:

"There is one thing that the Commission has asked Congress to do that may be of interest; it has urged a federal law against what we call commercial bribery. The National Association of Purchasing Agents has strongly supported the proposed law. Seventeen or eighteen of the states now have such laws. So far as I know they are wholly or partly dead letters in nearly all of those states, and for that reason the business man going into competition in a state where there is no such law says that he is under a handicap, that he cannot meet his competitor on the same grounds his competitors can occupy, because the state laws against commercial bribery are not equally enforced. We feel, if the federal law could be made the groundwork for the whole country and if everybody applied it the same throughout the states, that it would save some millions of dollars yearly for the business public, and more than that for the consuming public.

"Let me tell you what I mean by commercial bribery. Some of the people who commented on our work said that we were trying to prevent a man from giving his customer a cigar or, before the first of last July, buying him a drink or taking him to a theater. That is not it at all.

"For instance, there is a concern in Chicago whose president has an account of $8,000 a year for perfumery. That is the way it goes through the books. He said it was for Christmas presents, but couldn't explain exactly why he spent about a twelfth of the 'perfumery' money in February. That was too much to get by even on the theory of doing Christmas shopping early. Of course, it wasn't perfumery at all.

Secret Commissions

"There was another concern where we found that the secret commissions given to the employees of customers and customers of competitors amounted in two years to something like $1,400,000. The customers, of course, paid it all and the customers pay for that 'perfumery' I mentioned—all of it—and then pass it on to their customers and finally you or I or some other ultimate consumer pays for this 'perfumery.' But we don't know it and we do not even smell it.

"Now, we do not mean that, when you go to buy, you cannot be treated decently or be reasonably entertained. Nothing like that. We have had to include the word 'entertainment,' but we have always preceded it by the word 'lavish' entertainment. One of the forms of lavish entertainment is going into a poker game and losing money to a poor player.

"Commercial bribery, as we use the words, involves the transaction whereby a seller of goods gives something of value to the employee of his customer, or the employee of his prospective customer, or the employee of his competitor's customer, or prospective customer, without the knowledge of the employer, and for the purpose and with the effect, or with the purpose or with the effect, of causing the employee to seek to influence the buying judgment of his employer, that then constitutes commercial bribery. It does not make much difference whether it is 'perfumery' or this $1,400,000 I told you about, or an oyster stew —if it has the desired effect, it is commercial bribery.

"If the employer knows that the purchasing agent or his employees did have a corking good time and the other fellow paid for it, then the employer, if he has good horse sense, knows that that will be put on his bill and that he will pay for it, and that he has given his employees a good time.

Tests for Bribery

"Just as long as the employer knows about it there isn't any commercial bribery about it, but there is where it is done secretly. That is the situation where a concern goes to sell goods in competition and finds itself up against something intangible; it cannot get a hearing and cannot get by. If it is somebody between the man who is going to buy and the man who wants to sell, somebody interposing something between his judgment as to the seller and his goods that is secret and that the buyer does not know about and that the seller does not know about, why it is not a fair shake. The seller is not getting a shake on the merits or price or service that he offers. We say that it is not right and that we believe it comes under our prohibition.

"The three tests we apply are these:

"That the giving must be done without the knowledge of the employer.

"That the thing given or promised to be given be of so great value that *prima facie* the transaction is for the purpose of influencing the judgment or obtaining the secret support of the employee or purchasing agent.

"When the thing is of lesser value—here comes in the

element of entertaining—whether or not the manner of its giving, or of the promise to give, is such as either to be intended to or, in fact, to result in an undue influence upon the judgment or conduct of the employee of the purchaser or the prospective purchaser. If the entertainment is of such a character as to be the 'intensive cultivation of friendship,' unknown to the employer, then the practice is not good, and we recognize it as commercial bribery and put the ban on it.

"The whole end and aim of the Commission is to eliminate that element of unfair competition which must exist when the purchasing agent or other employee of a purchaser of goods brings an influence to bear upon his principal in favor of a given seller of such goods by reason of some secret benefit received by him directly or indirectly from the seller. The buyer of goods has a right to know whether the judgment of his employee is unprejudiced, or whether it has been clouded by gifts, gratuities, commissions, or even entertainment.

"I do not think that is unreasonable. Personally I think it would result in cutting out another one of those enormous wastes that are going on. The business world is full of just such wastes as that, where one man comes along and gives five dollars, and then another comes along and raises it to six dollars, and a third man comes along and makes it ten dollars, and away you go. It is all charged up in the bill and, in the end, the public pays the price of the whole business. Nobody makes a profit out of the transaction except that a scalawag has been made out of a man who ordinarily would be and wants to be an honest man. What is the use of it?

"Blue-Sky" Securities

"We have suggested that Congress enact some pretty stiff federal laws to take the place of or to back up the state laws against 'blue-sky' securities. Business men are constantly needing capital and credit. There is just so much capital in this country and there is just so much credit in this country. When legitimate business wanting capital and wanting credit to make further extensions and to enlarge and carry on its business has to go out in the open market and bid against a chromo dealer who is selling conversation, he cannot do it.

"All that we have suggested is that no agency, the Stock Exchange, or anybody else should put an O. K. on any security. It cannot be done with any certainty.

"During the war, I knew of no more careful committee, or no more useful temporary organization, than the Securities Issues Committee. It had to and did pass on the probable necessity of investments and of securities about to be issued. Of course, one of the things it had to deal with was oil. One day an outfit came along and wanted permission to issue securities to raise some money to dig for oil. The Bureau of Mines said it did not look very good, and the practical men in the oil business said there was nothing doing, they could not see it, and so the Securities Issues Committee—and I think this is one of the very very few times it did not guess it right—said, 'No, you cannot issue those securities.'

"These chaps said, 'All right. We want money to dig this hole and you say we cannot sell the stock. Well, we will just chip in the money and dig the hole anyway,' and they did, and the result was they hit a thousand-barrel gusher. You never can tell. So we say that it would be impossible for any public or private party to say that this is a good security or that that is not a meritorious security.

"And we say further that, when a security is issued, there should be made public a prospectus containing an exact statement of facts. It should show just how much money is actually going into the enterprise, how much is going to the broker, how much is going to the underlying syndicate, how much is going to advertising, and how much is going to leading citizens who sign letters of recommendation.

"If you have a security offered you and you can see from such a prospectus at a glance that 10 cents out of a dollar is going into the enterprise, and so in order to make 6 per cent on my investment it must be a 60 per cent proposition, you know at once that it is a long shot. Then, knowing it, if you want to take a chance, go ahead and take it, but you know what you are doing.

"We say that, as against such a showing, any legitimate business can go in with its operating sheet and its balance sheet and say, 'We need $150,000, or $1,000,000, this is what we are doing, this is what we have got, this is the amount of money going into the business and this is what it is to be used for,' and under those circumstances the business can get the money more cheaply even if the 'blue-sky' folks have to live for a while on their own conversation."

Strength of Airplane Beams

A REPORT on the strength of one-piece, solid, built-up and laminated wood airplane beams has been issued by the National Advisory Committee for Aeronautics.

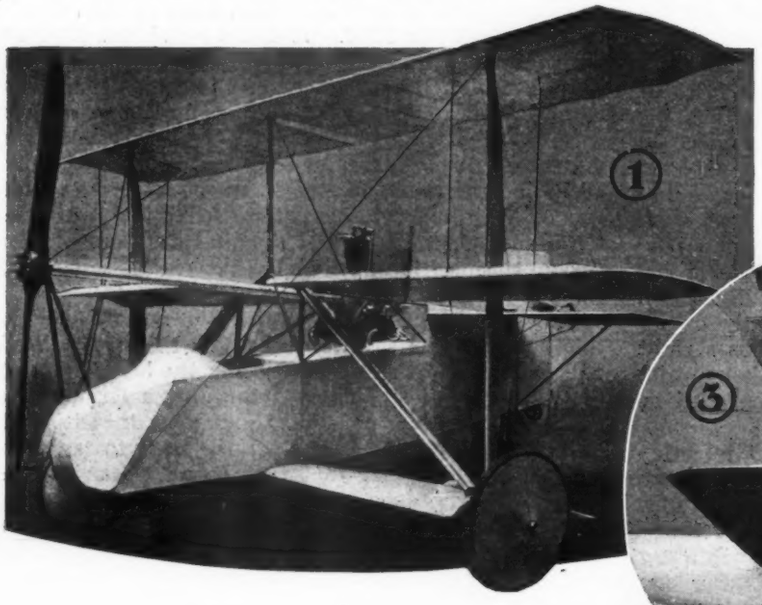
The committee found that beams of fir can be produced which, weight for weight, will prove as strong as those made from spruce but will show slightly less stiffness. Cypress cannot be considered a satisfactory substitute for spruce. Beams made up of three pieces can be produced which will be as strong as solid beam construction and beams of laminated construction can be built up as strong as one-piece solid construction. The details of construction employed in three-piece and laminated formations have a large influence on the strength of the finished beam. On the basis of equal section moduli, the rectangular sections are stronger than oblique sections.

The tests were made to determine the suitability of fir and cypress woods for airplane use as compared with Sitka spruce and to learn whether a plane rectangular I-section beam possessed any advantage over the oblique I-section beam which is used at present, other than the advantage of simplicity in shop operation. The increased demand for Sitka spruce has made it necessary to look elsewhere for satisfactory woods that will meet airplane requirements. This report not only deals with experiments leading to the use of a perfectly satisfactory substitute for spruce, but also with the development of some method of construction which will conserve the present supply by utilizing more of the selected material.

The built-up and laminated constructions eliminate the waste involved in the process of cutting the I-section from solid timber. In such construction it is also possible to use woods in short lengths, and though the cost of manufacturing built-up beams is somewhat greater than that of producing the solid beams, the cost of the raw material utilized is much less than the cost of the carefully selected timber used for solid beams.

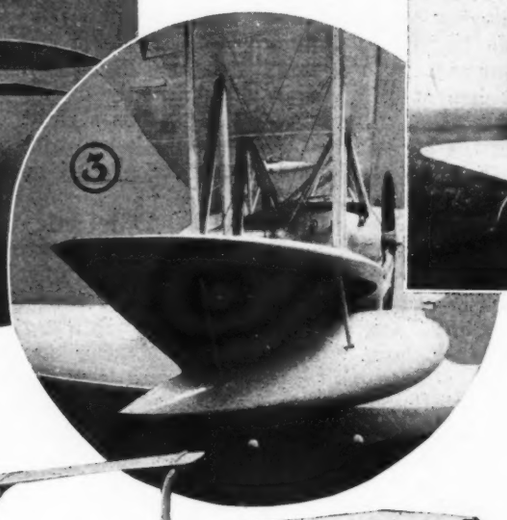
Copies of the complete report of the tests can be secured by asking for report No. 35 and addressing the National Advisory Committee for Aeronautics, New Navy Bldg., Washington, D. C.

Unusual Construction Shown at Paris Exhibit



1 — *Louis-Clement "baby" triplane*

2—*Streamline strut mounting on Spad-Herbemont*



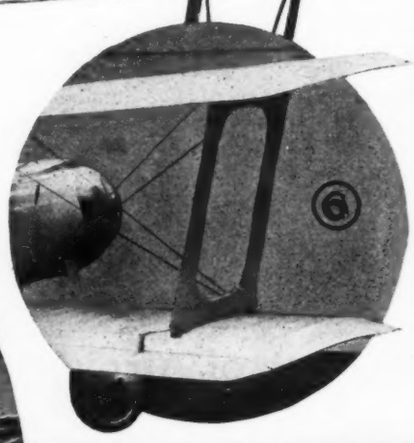
3—*A wing tip float*

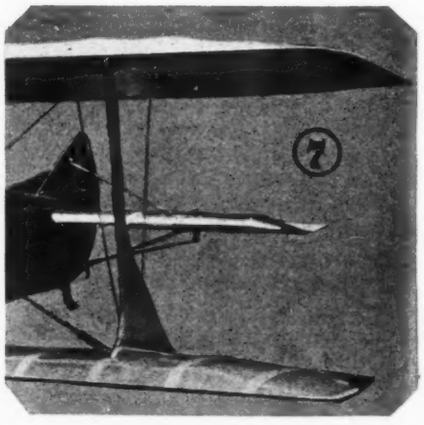
4—*An aileron balance*

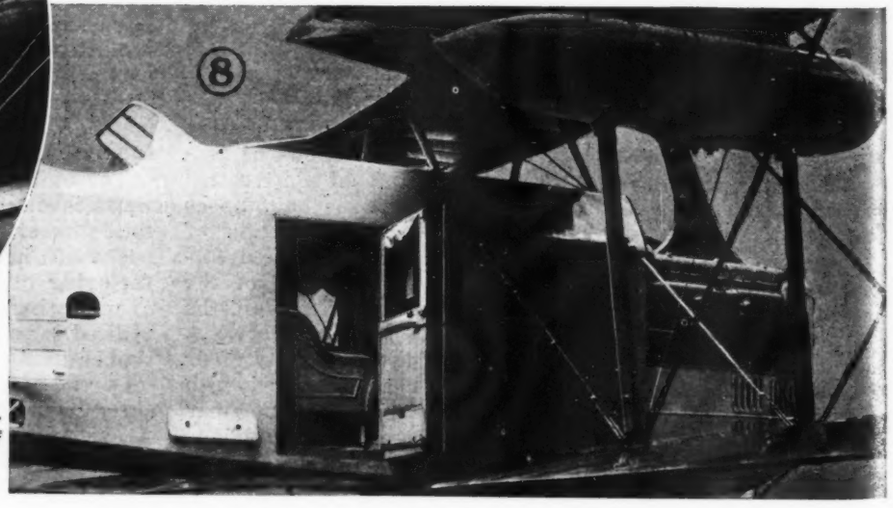
7—*Note the warping wire, pivot and strut base*

5—*A picture frame strut*

6—*Another picture frame strut*





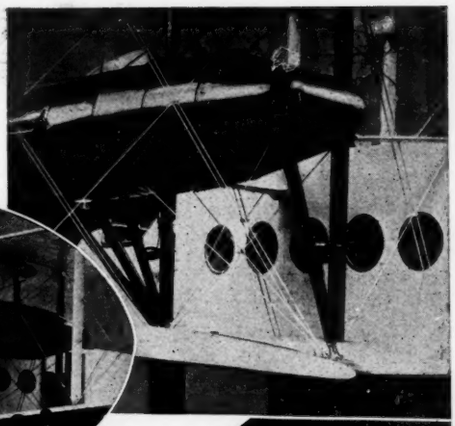


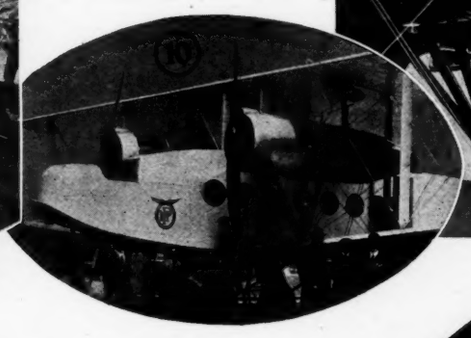
8—*The all-steel Breguet passenger cabin. This picture indicates the refinement of the interior fittings*

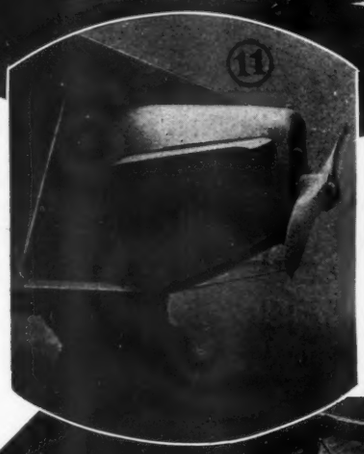
9—*Fuselage construction*

10—*Engine mounting on Handley-Page*

11—*Fiat exhaust manifold*

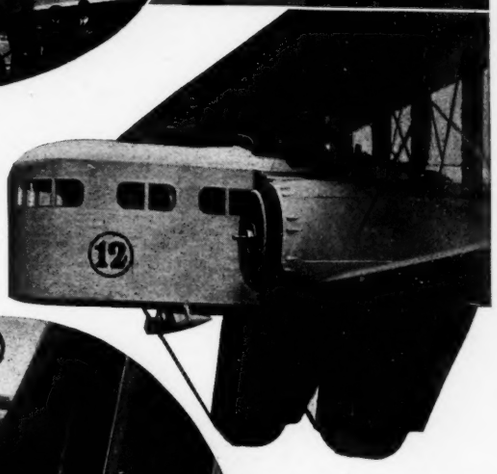


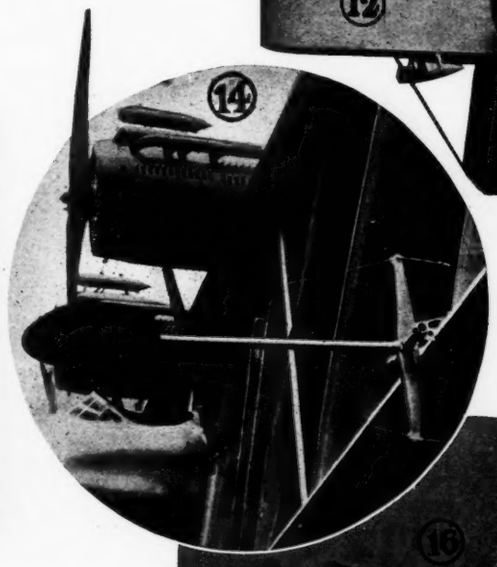




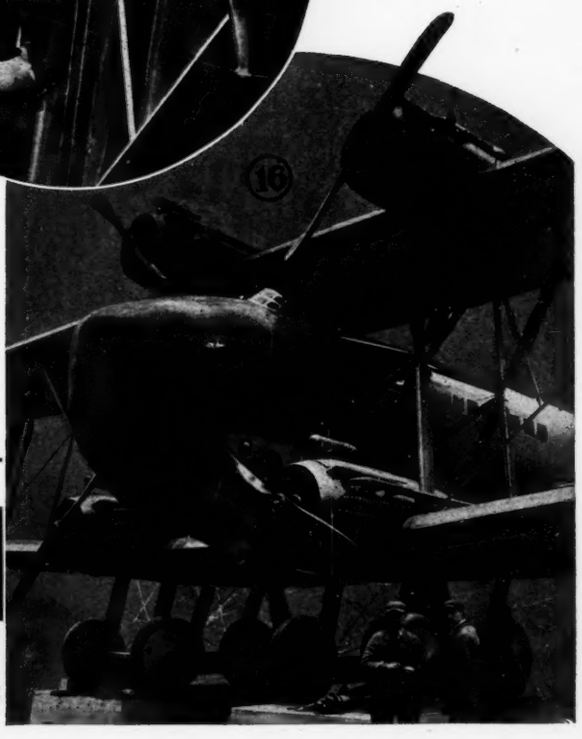
12—*Salmson engine mounting and cabin*

13—*Nieuport assembly. Note radiator*





14—*Bleriot counterbalances ailerons by small plane in front of leading edge*



15—*Spad-Herbemont express, Paris to London*

16—*Mounting of four 300-hp. engines on Bleriot 28-passenger plane*

American Cars Gain Favor in Spain

Like Portugal, Spain was prejudiced against American motor vehicles before the war. Most of the cars now used in the vicinity of Valencia are of American make. Sales to Spain are easier to make than deliveries. Increased transportation facilities will open a very wide market

By Allen Sinsheimer

A GOOD market exists in Spain for American-made automobiles, due chiefly to the changing opinions in that country and the post-war industrial conditions, according to a report made to the Department of Commerce. Prior to the war most of the automobiles were purchased from France. This condition is changing rapidly, and the majority of the new private cars to be seen are American.

In the Corunna district where 241 passenger cars, 47 motor buses and three motor trucks were registered in September of this year, the railroad communication for 3051 sq. miles of land totals but 90 miles, and consequently offers an opportunity for bus lines which have been increasing and prospering. There is considerable traffic between Corunna and Santiago, and the freight must either be sent by roundabout railroad routes, by sea or by oxcart, and merchants are rapidly learning that the motor truck offers a service superior to any of these. There are no agents for American cars in Corunna, this being due chiefly to the fact that suitable agents are hard to obtain and the few who have opened establishments were forced to retire because of their inability to secure shipments from this country. Corunna is, therefore, without representation of any American passenger automobile maker, and the cars sold are obtained through agents in other cities.

The usual conditions under which foreign cars have been purchased was one-third of the price on delivery, one-third 30 days after delivery and one-third 60 days after delivery, but even six months' time has been allowed.

The classification numbers of the Spanish import tariff and the rates of duty are as follows:

Tariff No.	Description.	Rate of duty per kilo In Pesetas.	In Dollars.
579	Automobiles, weighing up to 1,000 kilos (1 metric ton)	0.80	0.154
580	Automobiles weighing over 1,000 kilos.... Note: Open cars are subject to an additional tax of 200 pesetas ($38.60) each; and closed cars, 320 pesetas ($61.76) each.	1.00	.193
575	Motorcycles and parts, and automobile parts	3.00	.579
699	Tires	5.00	.965

Automobiles weighing over 1000 kilograms are allowed a reduction for tare of 200 kilograms for open and 400 kilograms for closed cars.

Other expenses, such as customhouse charges, clearance, cartage, etc., would amount to about 200 pesetas ($38.60).

(All conversions have been made at normal rate of exchange.)

The Santander district is reported to enjoy the extensive use of motor vehicles. Accurate statistics of the number of vehicles in use are not obtainable, but it is estimated that 750 passenger cars and 250 trucks are operated. A large number of these are of American manufacture and the chief competitive makes are French and English. American cars are popular because of their price and durability, and also because they are well adapted to the highways, being lighter as a rule.

There are about 100 passenger cars in use in the Vigo district, and 50 per cent of them are of American manufacture, and all imported since the beginning of the war. American cars are very popular and their sale at present is being hampered only by slow deliveries. For example, it is reported that of an order for 30 cars given six months ago, only three have been delivered thus far. The demand has been for elaborate, showy vehicles. The sale of automobiles during the latter years of the war was impeded by the scarcity and high price of gasoline, and it is expected that now that gasoline is readily procurable and the price somewhat lower (selling at $1.00 a gallon), and tending to decrease, this is no longer an important factor. The increasing cost of labor has made a demand for motor trucks. The expense of feeding oxen and the increased wages of drivers has a marked effect on the demand for trucks.

There are 1245 passenger cars and twelve motor trucks registered in this consular district, which includes the six Provinces of Albacete, Alicante, Castellon, Murcia, Teruel and Valencia. Although the city of Velencia has a population of 300,000, it and the entire province which takes its name boasts of only 580 passenger automobiles and five motor trucks, four of which are owned by the Spanish Army. Murcia ranks second with four trucks and 286 passenger cars, and Alicante third, with one truck and 208 automobiles. Teruel Province has 33 passenger cars and two trucks, Castellon has 56 cars and Albacete 82, there being no trucks registered in either Province.

Most of the cars in Valencia and vicinity are of American make. The country roads are not adapted to motoring.

So far as known there are no farm tractors of any kind in use in this consular district.

In the consular district embracing the Balearic Islands there are, according to the data given by the Department of Public Works in Palma, 275 motor vehicles in use at the present time. This number does not include an estimated 200 motorcycles, for the reason that motorcycles are not registered. About 100 motorcycles have sidecar attachments.

All but six of the 275 automobiles registered are touring cars, privately owned and devoted to pleasure purposes. The excepted six are motor buses used in carrying passengers between separated centers of population, and running on schedule like any other common carrier. Three of the six are in operation on the island of Mallorca, while the others are in Minorca. In addition there are almost always cars from the Continent to be found in the islands, especially in Mallorca—being those of tourists who are motoring about through the interesting sections. At present it is estimated that there are between 50 and 100 such cars of foreign registration now in Palma or Mahon.

Townsend Act, Revised and Strengthened, Again Before Congress

The Townsend Act has been re-christened and is now known as the National Highway Act. It embodies sound suggestions from all sections of the country and is considered a definite improvement on the original measure. Its two main objects are the construction of a national highway system and the creation of a Federal Highway Commission

THE measure known as the Townsend Bill has been redrawn and reintroduced in Congress. Henceforth it is to be known as the National Highway Act. It now embodies all of the features desired by all sections of the country, and in its present form will be pressed to definite action as firmly and consistently as legislative conditions will warrant.

Two main objects—the construction of a National Highway System and the creation of a Federal Highway Commission—are sought in the National Highway Act. It proposes that the commission shall establish, construct, maintain, improve and regulate a national system of highways composed of connecting inter-State roads which shall, by the most practicable routes and with due consideration for the principal centers of agricultural and industrial production, afford ingress into and egress from each State. Such national system may include highways to and from important water ports, and highways connecting at the border with the main highways in countries adjoining the United States, but shall not include any highway in a municipality having a population, as shown by the latest available Federal census, of five thousand or more.

The proposed act also provides that the commission may make all necessary surveys and maps in connection with the establishment, construction, maintenance, improvement or regulation of the national system of highways, and may construct, maintain, improve and regulate any highway which is a part of the national system, or, in its discretion, may contract with any State highway department for such surveys or maps, or for the construction, maintenance or improvement of any such highway in such State. Any such contract with a State highway department shall be based upon and shall include plans, specifications and estimates prepared by the commission, and the commission shall supervise and enforce the performance of such contracts.

It is also proposed that the portion of the national highway system in each State shall equal 1 per cent of the total highway mileage used as such in the State as ascertained by the commission. In every State where such 1 per cent will not suffice to enable the national highway system to afford at least two highways connecting with national highways in adjoining States, the commission shall increase the mileage of the national system sufficiently to provide two such highways. This provision has been included to avoid any semblance of partiality to any particular State.

The commission will be authorized to select as part of the national system any highway which has been constructed by or in behalf of a State or civil subdivision and which accords with a standard deemed by the commission to be adequate for present and probable future traffic, or which in the opinion of the commission can be reconstructed to accord with such standard. The commission shall value the reproduction cost of any such highway at current prices and wages and shall construct, or may, in its discretion, contract with the State highway department for the construction of other highways connecting or correlating with the national system of a mileage equal in value to the highway so selected, and to pay therefor out of the appropriation to be made for the construction of the national highway system.

One of the provisions of the proposed act is that no money so appropriated shall be expended in any State until the legislature of such State assents to the provisions of the act and to the taking over by the commission of existing state roads or rights of way as a part of the national system, except that until the final adjournment of the first regular session of the legislature held after the act takes effect the assent of the Governor of the State shall be sufficient to authorize such expenditures.

In consideration of the benefits to be derived by each State from the establishment of a national highway system, a condition precedent to the construction by the commission of any highway selected as part of the national system in such State, is that the existing right of way on the route of such highway shall be transferred by the State or the proper sub-division thereof to the United States as fully as may be permitted under the constitution of the State.

That only such durable types of surface and kinds of material shall be adopted for the construction and repair of any highway which is a part of the national system as will adequately meet the existing and probable future traffic needs and conditions. The commission will determine the types of construction and reconstruction, and the character of improvement, repair and maintenance, in each case selecting the type and character best suited for each locality, proper consideration being given to the probable character and extent of future traffic.

It is proposed that all highways in the national system shall, unless in the opinion of the commission rendered impracticable by physical conditions, excessive cost or legal obstacles, have a right of way of the width of not less than sixty-six feet and a wearing surface of an adequate width which shall not be less than twenty feet.

That for the purpose of carrying out the provisions of the act, it is proposed to appropriate $50,000,000, which shall become immediately available; $75,000,000 for the fiscal year beginning July 1, 1920, and $100,000,000 for each of the three succeeding fiscal years, in all $425,000,000, which shall be available until expended.

Mass of Detail Obscures Essentials in Industrial Education

Some books of instructions to foremen are so full of detail that a clear picture is not reflected upon the reader's mind. To present successfully such material in a simple manner is a highly specialized and difficult task. Mr. Tipper points out that simplicity must not be confounded with meagerness.

By Harry Tipper

THE other day in talking with a doctor friend concerning research, I referred to the statements of some of the members of his profession during the epidemic of influenza the previous year and added that I found myself unable to see the logic of the position which these men had taken. "The trouble with those fellows," he said, "is that when they have discovered some symptoms they imagine they are on the track of the cause. They think in units, influenza is influenza to them and not a symptom of other and earlier derangements of the system."

I cannot vouch for the correctness of his criticism of the men we were talking about, but the same thing is true of so many men in business and professional work that I suspect he is justified in his statements.

The employer who says he has no labor trouble just because his shop has not been kept out of production by a strike or who claims to have avoided trouble by giving the men what they demanded, the engineer who says that production is a matter of motion and system, the educator who says that the the students are educated who are able to learn some textbooks and some rules, are subject to the same criticism.

The matter occurred to my mind again the other day after looking over some of the books of instruction for foremen, which were the written records of the educational training they had received. These books showed a most painstaking endeavor to give the foreman a true understanding of every production department with which they had to deal or which kept contact with the men in their charge. Each lecture was a careful and consecutive arrangement of the policy and detail operation of each department as it touched the foremen and the men over whom he had supervision. That, in fact, was the great weakness of the book and of the lectures which formed the main text. One of them was read by a very intelligent man of my acquaintance, as far as he could, and he confessed his utter inability to understand some of the chapters and the confusion in which some of the lectures left him.

After reading some of the volumes in question rather hurriedly, I went over part of the lectures in the various educational systems thoroughly and was amazed at the detail which the foreman was supposed to acquire in respect of the operations of the other departments of the factory.

Each of the lectures I studied could have been expanded into a course of ten or fifteen and made the basis for specialized education, for any one wishing to engage himself in any one of the departments. Each department had endeavored to explain the reasons for its actions so clearly that it had (by the very desire for clarity) succeeded in getting in so much that the detail obscured the purposes entirely.

The youngster when he begins to draw always wants to put in all the detail, and the consequence is that the drawing is neither a blue-print nor a picture. When the artist has matured he learns how to draw one or two lines and create such a definite expression of whatever he is drawing that the imagination can fill in the details to the extent of its perception, and it is only when he arrives at that stage of his technique that his pictures are strong and gripping. Sir Walter Scott wrote several pages of detail description in the attempt to paint Sherwood Forest and succeeded in leaving little impression, whereas Kipling in "The Light that Failed" describes the desert in Egypt in one sentence which pictures the place.

The detail operation of a department or even the detail reasons for its operations are necessary only to those who specialize in its operations; they cannot be seized upon and understood rapidly, they must be studied bit by bit and operated in order to be thoroughly understood. Many men specialize in a department of business all their lives without understanding the significance of the detail in all particulars.

The presence of much detail, in the lesson which a man must be able to grasp quickly, is only confusing to his mind and makes it impossible for him to get the significance of the few things which he must thoroughly understand.

In considering any such educational efforts to promote the interests of the company by enlarging the understanding of its supervisors, it is obvious that the information, which is possessed by them in respect of the company outside of their own departments, must be such as will picture the essentialities and their share of the responsibility for making these essentialities efficient.

This does not require much detail, but it does require a very careful study of the facts of the case so that only those portions are presented which are essential and that all the non-essential material is omitted. It is at this point that the ordinary business man fails when he comes to transmit his knowledge to someone else who is only generally interested in what he has to say.

For few engineers can talk engineering so as to interest and enlighten a general audience, few sales managers can do it and very few financial men are

capable of handling the matter any more efficiently. The same thing crops out in these courses of instruction for foremen and subordinate supervisors in connection with their necessary operations.

We mentioned last week that little time was spent in any of these courses in explaining the psychological side of the company's policies, its ideals and the reasons for its organization. These are the most essential parts of the picture, for if these are understood the detail activities of the company will fall into their places and serve to fill out the picture to its proper depth and perspective. Any such course for foremen and subforemen and other subordinate supervisors should be arranged to deal with organization first, its growth, ideals and policies and the characteristic of this whole educational effort should be simplicity.

Do not confound this simplicity with meagerness and poor vocabulary. Contrary to the usual supposition, simplicity is not a native virtue present in all men; simplicity of mind and expression is one of the most dfficult of arts to acquire, and the average man shows his confusion in attempting to cover his own paucity of expression, by referring to it as simplicity. It is true that simplicity does carry with it a knowledge of the audience and of their limitations and styles of expression so that the material may be simple to that particular audience, but it does not imply a lack of study nor a lack of knowledge of the art of expression, it really demands the most severe study and understanding of it.

Just as the artist does not attain simplicity of line until he has passed through a long education in the elimination of the unessential and the control of the essential, just as the musician must go through the same long schooling; the man who would be simple in his endeavor to educate must be prepared to study his subject thoroughly, and his audience with equal care, so that he can throw away everything that is not necessary, and be sure that all that is left will count to create a vivid picture of what he wants to implant in their minds.

When the material for the course of education has been so gathered that it possesses the necessary simplicity of treatment and the proper virility of picture, this material should be arranged in the order of importance which it must assume in the operations of the foremen and sub-foremen. This order of importance should be in relation, not to the volume of work required from the foremen in this matter, but the amount of judgment which must be given constantly to its proper execution. In the work of every supervisor there are matters which are wholly routine, or almost entirely so; they call for little or no exercise of judgment on his part, the methods are standard, the rules are fixed or the discretionary power is lodged in more responsible hands. There are other matters which call for the foreman's judgment and upon which he must act if the operations of his department are to be kept running smoothly. These are the matters which are of the most importance and in respect to which his training should be thorough and careful. These are the matters which should be given precedence in the training, and which should be given this precedence not only in position in the course but in the amount of time spent on the particular portion.

Finally, while the information for the course may have to come from the heads of a number of different departments, it should be assembled for use in the school by a man trained in the art of teaching, and this man should have full charge of the course from its inception.

However well the heads of the departments may know their work, most of them are not adepts at the art of self-expression (if the material they write is any criterion, most of them need an equally expert audience for their writings). They are usually without the proper discrimination between the essential facts required to picture the work to the foremen and the unessential features.

They have the information and this information should be secured and understood by the man who has charge of the instruction, but he should have the responsibility of putting it in shape, of getting it to the students so that they understand it, and of turning them out of the school with the proper amount of knowledge.

Kansas Establishes Body to Settle Industrial Disputes

WHILE the Lusk Committee in New York chases Bolshevists, and the United States Senate debates the Kenyon Industrial Relations Bill, Kansas has again stepped to the front with a constructive attempt to solve a difficult problem. Having had empty jails for several years, Kansas has now decided to establish a clearing house for industrial relations; a Court of Industrial Relations invested with broad scope for investigation and decision and with considerable powers for enforcing its decisions. The court actually came into being on February 2, 1920, so that no accurate guess as to its success or failure is now possible.

The chief provisions of the bill which created this court may be briefly enumerated. This Court of Industrial Relations is composed of three men, appointed by the Governor "by and with the advice and consent of the Senate." Their jurisdiction extends over all manufacturing and public utility concerns whose continuous operation is deemed essential to the welfare of the whole community. The concerns affected include those manufacturing food products of any kind, those manufacturing clothing of any kind, mining, transportation, and public utilities.

The Court has power to enter any industrial dispute on its own initiative, to take testimony, make investigations, and *"to settle and adjust all such controversies."* It may also act in like manner when complaint has been made by either party to the dispute. In rendering its decisions, "the Court of Industrial Relations *shall order* such changes, if any, as are necessary to be made in and about the conduct of such industry . . . in matters of working and living conditions, hours of labor, rules and practices, and a reasonable minimum wage, or standard of wages, to conform to the findings of the Court in such matters."

If either party to the controversy believes the decision of the Court to be unjust, it may appeal to the Court for a modification of the award. In case the final decision of the Court of Industrial Relations is not satisfactory to either of the parties concerned, further appeal may be made to the Supreme Court of the State of Kansas. The Supreme Court is the final authority and its decision stands without the right of further appeal.

AUTOMOTIVE INDUSTRIES
The Automobile

PUBLISHED WEEKLY
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VOL. XLII Thursday, February 12, 1920 NO. 7

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United States and Mexico ---------- One Year, $3.00
Extra postage west of the Mississippi River on account of Zone Postage Law, 0.50
Canada ---------- One Year, 5.00
Foreign Countries ---------- One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft. Post-Office or Express Money Order or Register your letter.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Successful Exporting

THE exportation of American-made automotive equipment in 1919, details of which are published elsewhere in this issue, reveals a most gratifying although expected record well in excess of any previous twelve-month period. Makers in this country will not be surprised at that news, although some of the details may cause them to pause and to consider.

The first mention, perhaps, should be made of the heavy purchases of the English-speaking dominions of the British Empire. Canada, the United Kingdom, Australia, British South Africa and New Zealand, in the order named, were the greatest buyers of passenger cars from this country. After them followed Cuba and Mexico—both next-door neighbors—British India and Denmark. In other words, a large percentage—the largest in every way of calculation—went to English peoples, as the native-speaking populations of the various British dominions may be considered as small. Nations having another language are far down the list.

Perhaps this may be explained primarily by the lack of production in Great Britain and by the readiness of American makers to ship their products. Perhaps also it may be explained to a certain extent by the kindred of English-speaking peoples, which has been solidified by the task of defeating Germany. Furthermore, the racial characteristics of the Anglo-Saxon, coupled with greater riches and more favorable exchange, have had some bearing upon this outstanding development of the commercial year.

But, one may wonder if it is not partially attributable to the American manufacturer himself. It is so much easier to sell a car to a man whose language is the same as our own. It requires no special literature, no different advertising and no changed sales talk, all of which would be necessary in, for instance, a Spanish-speaking country.

Successful exportation to all parts of the world, particularly so in the years following the present unusual selling season, can be brought about only by intelligent planning, by carefully plotted work, much different from that required with a common language, and only those who seek it, accepting the mental effort and the changed viewpoint as part of the task, along broad lines may expect to continue in the field. The policy of following the least resistance will not sell cars in the foreign market.

Standardization on Broader Lines

DURING the past two years the Society of Automotive Engineers has been endeavoring to standardize farm tractor design, and although not much progress has yet been made, something has been accomplished at least. The standards worked out by the Tractor Division of the Standards Committee and approved successively by the Committee, the Council and the general membership, have been promulgated as S. A. E. standards.

A new aspect has been placed on standardization by a recent action of the National Implement & Vehicle Manufacturers' Association, whereby that organization acquires a voice in the promulgation of tractor standards. The N. I. & V. M. A. apparently does not intend itself to formulate standards but will co-operate with the Society of Automotive Engineers and the American Society of Agricultural Engineers, so that any proposed standard which receives the approval of the N. I. & V. M. A. and one or the other of the two engineering organizations mentioned will be promulgated as an Agricultural Equipment standard. It is more than likely that standardization proposals relating to any features of farm tractors, except those having to do with the connection of the tractor to the implement and with the power take-off, will be handled by the S. A. E. Hence it would seem that in the future there will be two classes or degrees of tractor standards, S. A. E. standards and Agricultural Equipment standards.

Standardization of engineering products, however, is to be carried on on a broader basis than hereto-

fore, the American Engineering Standards Committee having been formed to supervise and regulate standardization in all lines of engineering endeavor in this country and to foster international co-operation in matters of standardization. If this committee finds that a certain standard has been formulated under the proper auspices and sponsored by the right interests, it will give the standard official recognition and the same will become an American standard (tentative standard or recommended practice).

A certain time will necessarily elapse between the adoption of a standard by one organization, and action upon it by the organization next higher in the scale of standardization authority. Since standards occasionally require revision—and from the experience with S. A. E. standards so far this need arises frequently—there seems to be a possibility that we may have in the future three different standards on the same subject at the same time—an S. A. E. standard not yet approved by the N. I. & V. M. A., an Agricultural Equipment standard not yet recognized by the Engineering Standards Committee, and an earlier standard which has reached the state of American standard but possibly has been superseded by practice. Such a state of things would be intolerable.

There is no doubt that we should organize for standardization work on a broader basis than in the past. In some respects the British made a more fortunate start than we, by organizing first the general committee with control over all engineering standardization, and then branching out as the demand for standardization arose in different lines of industry. It seems to give a more logically built-up organization. On the other hand, by starting a standardization in those special lines where the need was most apparent, we have certainly made more rapid progress so far. What we shall accomplish in the future will depend upon whether we can keep alive the spirit of co-operation that has pervaded the standardization work of the S. A. E. in the past, banishing all petty jealousies and "politics."

Building the Bridge

GRANTING that the ideas and plans of the progressive employer in regard to his relations with his employees are essentially correct and honestly conceived, why does he so often find it more difficult to "sell" those ideas to his workmen than does the radical who comes from the outside to sell more revolutionary goods?

The fundamental reason has been pointed out in AUTOMOTIVE INDUSTRIES on several previous occasions: The employer frequently does not take enough time to understand thoroughly the worker's point of view—the point of view which must be the starting place of their mental relations. This basic difficulty divides itself into numerous subdivisions.

Take, for instance, the employer who is dealing to a large extent with foreign workers; with men who speak our language imperfectly and understand our customs to only a limited extent. The employer has been reared in an environment and with ideas so different from those of his employees that they might literally be said to have come from different worlds. This employer is likely to base his dealings with these men solely upon those things which he himself understands. Even though his employees do speak and understand English, the difference of previous environment has been such that the employer, speaking only in terms of his own experience, is as little understood as to his purposes and motives as though he actually spoke in a tongue totally unintelligible to his hearers.

In his attempt to infuse his men with the spirit and ideals of our American democracy, he is prone to forget that a bridge must first be built between, let us say, Lithuanian ideas and American ideas, across which the Lithuanian mind can advance steadily and intelligently. And the bridge must start in Lithuania; it must be built to America. This is impossible unless the employer knows something about Lithuania.

The radical leader, dealing in less excellent goods, constructs his sales talk along lines easily understood and extremely attractive to the workman. If he be dealing with the Lithuanian, he bases his talk upon things with which the Lithuanian is already familiar. Even though he speak in the English language, he uses similes, allusions and ideas which are familiar to his listener. He obtains, in presenting his goods for sale, that fundamental for which every public speaker and every salesman strives—the point of contact—the place in Lithuania from which the bridge to America may be built. He knows of and uses "those traditions arising from political backgrounds which facilitate the spreading of radical propaganda by those who are familiar with the ideals, the racial instincts and the political history of these races."

It is this superior understanding of his audience, rather than any particular excellence of material, that enables the radical, more easily than the employer, to sell his ideas to the worker. He usually has a running start on the employer since his own early surroundings and environment probably have been, to some extent at least, those of the workers to whom he is addressing his propaganda.

This fact makes the task of the employer more difficult but points out the direct path only the more clearly. To understand the ideals, racial prejudices and real desires of a group of men reared under utterly different circumstances is not an easy task. It is one requiring patience, time and energy. It is a matter for profound study and cannot be solved by catch-phrases or even by high motives.

The work of the radical can be offset and the task of constructive Americanization accomplished only by "time and patience expended by the manufacturer in understanding the worker's position, the worker's point of view, and the things which he really desires."

WHAT are the rules and regulations regarding the operation of civilian and commercial aircraft in the United States?

Car Shortage, Bad Weather and "Flu" Curtail Production

Forty Per Cent of January Output Driven Overland for Distribution—Only 50 Per Cent of Normal Empty Cars Available—Factories Give Production Figures

DETROIT, Feb. 7—Curtailed production marked the effort in nearly all automobile plants in the Detroit district in January, due to lack of freight cars, bad weather and the influenza epidemic. Maxwell-Chalmers officials spread the only ray of sunshine with the declaration that January was the biggest winter month they had ever experienced despite the many handicaps.

The freight situation has become so serious that manufacturers practically have given up hope of securing equipment for handling finished cars and are driving away from 200 to 500 miles and some have gone as far as Iowa. Impassable roads alone have halted attempts to send cars overland and in many instances roads that appeared impossible of passage have been negotiated by daring manufacturers in fulfilling contracts with dealers and owners.

This effort on the part of the builders alone prevented a practically complete tie-up of factories with resultant loss in production and revenue and loss of work for thousands of men, with added discontent and further unsettled labor conditions following. Even the efforts to continue operation by the use of trucks in many cases in hauling parts to the factories and overland deliveries might have failed of effect in keeping all hands busy had it not been for the inroads made by the "flu" epidemic, which kept hundreds away from nearly every plant throughout the month.

Statistics compiled by traffic officials show that only 50 per cent of the normal supply of "empties" were available during January for all classes of freight. Automobiles naturally formed a large bulk percentage of this freight, and requiring as they do large-door cars, faced a still greater handicap.

Forty Per Cent Driveaways

It is estimated that 40 per cent of the finished cars and trucks were sent to their destinations overland, as against 10 per cent at this season of the year under normal conditions.

This fact, in the opinion of manufacturers, discounts the plaint of Government railroad officials that weather conditions chiefly are responsible. Manufacturers contend that the industry has weathered many winters just as severe as this without the present freight conditions and charge inefficiency and mismanagement as the real causes. The opinion is general that congested conditions will continue until the railroads have been returned to private control and sufficient time has elapsed to give the owners opportunity to adjust schedules looking to normal traffic conditions.

From 300 to 400 empty cars come into Detroit territory every day under normal conditions for automobile shipments alone. Only 35 per cent of the normal rolling stock was received in January, and on one or two days only 10 per cent of the normal quota of "empties" was received. Combined efforts of all influences to bring about a remedy have failed, replies from the railroad administration offices in Washington in every instance bringing the stereotyped statement that more cars would be sent when possible.

Storage Space Scarce

Almost every inch of available storage space has been commandeered by manufacturers, but it is inadequate to care for the cars awaiting shipment, necessitating the overland movement in so far as is possible. Fortunately road conditions to the southeast as far as Pittsburgh and Philadelphia and west to Iowa, have been such as to permit driveaways, but in the event of severe weather in territory that now is open preventing overland deliveries production must stop.

Inbound freight schedules have not been hampered so seriously and the manufacturers have been able to get parts and equipment to a degree nearly normal in most instances. Many complaints on this score have developed, however, and the plants in Flint, Pontiac and other cities out in the state have used trucks to haul from Detroit to a great extent. The fact that inbound shipments of parts have arrived in sufficient quantities is due solely to the curtailed production.

The influenza epidemic spared no departments and the administrative branches have been as badly handicapped as the factory departments. The deaths of John Dodge and J. L. Vette, production manager at the Hudson plant, spread fear among the factories and the least indication of an attack prompted individuals to leave the desks or work benches, until the working organizations in many cases were reduced to mere skeletons of their former size.

Ford Motor Co. with an output of 3200 cars a day, used the overland system, in so far as it was possible, up to a distance of 200 miles. Ford schedule production of 1,000,000 cars during 1920 will necessitate an increase over the January output, but until the handicap of bad weather, disease and freight congestion are eliminated, little hope is seen for normal schedule. The influenza epidemic cut off from 15 to 20 per cent of the entire force, a majority of whom are still idle.

Packard Motor Car Co. is driving away wherever conditions will permit. The company estimated it was behind 10 days in production during the month of January as the result of the combination of handicaps. Packard conditions like others were due chiefly to freight car shortage, though approximately 25 per cent of their employees were off on account of the epidemic.

Dodge Brothers have been driving away as far south as Alabama, west to Kansas City, and in fact have not limited the driveaway distance. About 75 per cent of Dodge production was sent to its destination by the overland route.

Parts Shortage Felt

Hudson Motor Car Co. and Essex Motors are driving away an average of 100 Super-Sixes and 150 Essex cars each day, and have been since freight conditions have been so critical. There has also been some delay in getting parts at the Hudson plant. The influenza epidemic attacked all departments of the Hudson plant, administrative and factory, and each day has seen from a score to a hundred vacancies in the line of the employees reporting for work.

Maxwell-Chalmers, although reporting several hundred employees absent on account of the "flu," sounds an optimistic key in the statement that January was their record winter month. The overland route, however, has been utilized, in so far as possible, for the delivery of Maxwell and Chalmers cars. Only where roads were absolutely impassable were the cars sent by freight.

Sales Manager Toner declared it was all right for dealers close by, but was proving a great hardship on those far away. The limited field, he said, also would prove a hardship from the manufacturer's standpoint. Dealers, in most instances, are taking as many cars as can be delivered, and storing those which have not already been sold. Maxwell-Chalmers have confined their driveaways to a distance of 500 miles.

Cadillac Builds 400

Cadillac Motor Car Co. is driving away all cars for out-of-town delivery. The freight condition grew so bad early in January that officials realized the futility of attempting to deliver by rail. Cadillac is getting its parts chiefly by express. The company built 400 cars in January, which is far behind its schedule. They are just getting into production of the new model and January was a between month. The company will not begin to produce up to schedule before the latter part of this month. The program calls for an output of 70 cars per day.

Paige-Detroit Motor Car Co. is driving away about 30 per cent of the output. With a schedule of 2600 for January the company was able to build about one-half, but it is expected the program outlined for 1920 will be reached in the February production. The company was badly hampered by lack of parts

and equipment during January, but report conditions improving. The lack of freight cars compelled them to hold back shipment on many cars which could not be sent overland on account of the long distance to destination.

King Motor Car Co. felt the effect of the freight car shortage to as great an extent as any of the other factories, though there were few driveaways from the King plant. The company will not get well started with production of their new model before March. Only 200 cars were completed during January.

Studebaker Handicapped

Studebaker Corp. of America produced an average of 140 cars a day in January, and reports little trouble as a result of the delay of inbound freight. Like all of the others, Studebaker was handicapped by the lack of rolling stock for shipping new cars and was compelled to drive away about 25 per cent of the output. The others are being held until freight cars are available. Factory officials contented themselves with the statement that freight cars were out of the question and they had quit attempting to get them. The South Bend plant is just getting ready to start production on the new Light Six.

Scripps-Booth Corp. are driving away wherever possible, though the eastern limit has been Pittsburgh, and Knoxville to the south. Snow and bad roads beyond those points prevent any attempt at longer driveaways. Some few cars have been driven west, but in most instances where freight cars were not available western deliveries have been held up and output stored. Scripps has been able to get their parts on almost normal schedule.

Liberty Motor Car Co. found chief delay during January, caused by the inability to get bodies. Lack of freight cars also proved a serious handicap and compelled the company to adopt the overland system to a great extent. The influenza epidemic hit officials and the factory also, all handicaps coming just at the time when the company was moving to its new location. The first few days in January production was limited to 5 a day on the new model, but thereafter a schedule of 15 a day was maintained, and the company hopes to reach a production of 500 during February.

Hupp Output 1600

Hupp Motor Corp. turned out 1600 cars in January, the output being curtailed 25 per cent by reason of the freight car shortage. Conditions were equally bad on inbound and outbound freight. The epidemic cut deeply into the Hupp organization.

Saxon Motor Car Co. produced no cars in January, save in clearing up the 1919 schedule for export. It is fortunate that no attempt was made to make the 1920 schedule on account of the delay in getting parts. The company hopes to reach the 1920 production schedule with this month's effort.

Columbia Motor Co. is driving away 75 per cent of its cars. One shipment, destined to Iowa, was sent over the roads last week. Columbia has been giving no thought to distance or destination, where there was a possibility of getting the cars to dealers overland, during the freight car shortage.

E. A. Nelson Motor Car Co. suffered from freight car shortage, their troubles developing on both inbound freight and equipment for hauling away finished new cars. The company's production was an average of 4 a day during January, and it will not get into full production until late in March, when they hope to reach the schedule of 15 a day.

The Friend Motor Corp. at Pontiac and the Harroun Motor Corp. at Wayne made no attempt to produce cars during January. Both companies are preparing to start on a refinancing program and will be in full production in from 30 to 60 days. Meanwhile the time is being taken advantage of in accumulating parts and equipment to keep both running without interruption.

Dort Motor Car Co. probably felt the freight shortage to a greater extent than any of the others, because of the fact that road conditions out of Flint were so bad it was impossible to make driveaways. The inbound freight shipments also were very bad, several cars being held up at Toledo two weeks and a 20-day delay on cars in Chicago crippling the plant. A lack of power also hampered the company's operations, and only 2500 of the scheduled 3000 cars were produced.

Olds Near Schedule

Olds Motor Works at Lansing produced 3700 cars of the scheduled 4200, 75 per cent of which were sent to their destination overland. The company felt the effects of the epidemic and the freight car shortage as badly as any of the Detroit factories, and gave little thought to distance in driveaways.

Chevrolet Motor Co. at Flint is driving away cars wherever possible and the majority of the others are being stored, some of them in fields adjacent to the plant in Flint. The company has been in transit six weeks. The tie-up, wherever they could be secured. The shutdown of the power plant in Flint kept Chevrolet practically idle an entire week, but despite all handicaps 4000 cars were produced during January.

Oakland Motor Car Co., which owns 70 freight cars, was particularly fortunate in getting part of their output delivered, though they were compelled to resort to driveaways in getting 75 per cent of the new cars to dealers. Trucks were used to haul parts from Detroit.

Lorraine Motors Corp. at Grand Rapids has been unable to get any freight cars, and although the output of the factory was very limited during January practically all of the new cars were driven away. The company was able to get only about 50 per cent of the parts for which it had contracted.

Jackson Motors Corp. at Jackson was handicapped both on inbound and outbound freight during January. Production was cut to an average of 4 a day. The program calls for twice that many during February. Cars were driven away from the factory wherever it was possible to reach their destination over the snowbound roadways. Where driveaways were impossible the majority of cars were held at the plant, delaying deliveries many days in almost every instance.

Briscoe Builds 1000

Briscoe Motor Corp. at Jackson has been kept busy reorganizing their plant and getting ready for production on the new job. About 1000 cars were built during January, cleaning up the old model. Production on the new car was started Feb. 1. Most of the cars produced in January were for export and

(*Continued on page* 481)

January Car Output

Car	January	Daily Average
Briscoe	1,000	34
Buick	15,000	500
Cadillac	400	14
Chalmers	1,200	40
Chevrolet	4,000	135
Columbia	600	20
Dodge	16,500	550
Dort	2,500	84
Essex	3,750	125
Friend (A)	—	—
Ford	96,000	3,200
Handley-Knight (B)	—	—
Harroun (H)	—	—
Hudson	3,000	100
Hupmobile	1,600	55
Jackson	100	4
King	200	7
Liberty	350	12
Lincoln (O)	—	—
Lorraine	30	1
Nelson	120	4
Maxwell	6,700	225
Oakland	3,800	127
Oldsmobile	3,700	124
Overland	13,060	435
Packard	1,920	64
Paige	1,300	43
Paterson	220	7
Reo	1,200	40
Roamer	110	4
Saxon (Z)	—	—
Scripps-Booth	750	25
Studebaker (X)	4,200	140
Willys-Knight (K)	—	—
Wills-Lee (D)	—	—
Total	185,310	6,119

A—Friend Motor Corp., formerly Olympian Motor Corp., not yet in production on new Friend car.
B—Handley-Knight Co., not yet in production.
R—Harroun Motors Corp., recently refinanced, not yet in production.
O—Lincoln Motor Co., in production April 1.
Z—Saxon Motor Car Co., not in production on new car until March 1.
X—Report on Detroit plant. Production at South Bend just starting on new six.
K—Production started on Model 20 Knight Feb. 1. Only a few produced in January.
D—Wills-Lee Corp., not in production until summer.

England to Supplant Fuel Tax With Registration System

Society of Motor Manufacturers and Traders Recommends New Plan of Lessening Operating Burden Without Reducing Annual Revenue

LONDON, Feb. 1—(*Special Correspondence*)—Motor vehicle registration tax is recommended to supplant the present fuel tax in England by the Society of Motor Manufacturers and Traders. The new system has many advantages, but shows that the English car-owner pays much heavier taxes than does the American.

Up to the present time owners of motor vehicles in England have paid their motor taxes in the form of a tax on fuel instead of paying registration fees as in this country. The present tax is about 12 cents a gallon for passenger cars and 6 cents a gallon for commercial vehicles, while the price of gasoline in the British Isles is about 73 cents an imperial gallon.

For many years there was dissatisfaction with this fuel tax, and the Government finally requested the Society of Motor Manufacturers and Traders to devise some other method of raising the $35,000,000 which the fuel tax annually yields. This society, which constitutes the last word in British motor affairs, studied the problem carefully and has finally recommended a registration tax system to supplant the fuel tax.

The system suggested is based upon the figures shown in the box below. Should this new system go into effect, as it doubtless will, a number of changes will take place. To begin with the price of gasoline will be reduced from 73 cents to 61 cents an Imperial gallon.

One of the most important advantages from the point of view of the automobile trade will be that England will thus for the first time have a registration system by which the numbers of cars actually in use in the country can be determined. Thus far the owner of a motor vehicle has merely had to take out a license when he bought his car. This license was good for ever, so that the number of licenses out was no indication whatever as to the number of cars on the island.

According to this estimate presented by the Society of Motor Manufacturers and Traders there are approximately 366,000 cars and trucks in the United Kingdom, while a total of about 200,000 motorcycles are actually in use. This makes a total of about 566,000 motor vehicles in England and Wales. From these vehicles it is planned to raise an annual tax of about $35,000,000. It is interesting to compare this estimated revenue with that raised from the 555,789 cars and trucks in New York during 1919. The total registration fees in New York for 1919 amounted to $5,881,623, approximately one-sixth of what England plans to raise from about the same number of cars. Thus the British car owner will have to pay about six times as much for the privilege of owning a motor car as the citizen of New York State.

Wisconsin, for instance, has in use about one-half the number of motor vehicles estimated for England, while the registration fees collected by that state are about one-thirteenth of those which will be paid by a similar number of English car owners.

A comparison of the total fees paid by American car owners in proportion to those which are to be levied in Great Britain is interesitng. The total vehicle registration in the United States including cars, trucks and motorcycles during 1919 was approximately 7,700,000; this is to be compared with 566,000 for England. Thus it appears that the United States has 118 times as many motor vehicles as England. The fees in the United States, however, amounted to about $64,500,000 as against an estimated $35,000,000 for England. This means that although there are 118 times as many motor vehicles here as in England the tax paid on them amounts to less than twice as much.

And even under the new conditions gasoline in England will cost 63 cents an imperial gallon, which is only one-eighth larger than the American gallon.

CARS AND TRUCKS NEEDED

WASHINGTON, Feb. 10—There is a good market for motor vehicles in India, according to a recent commerce report. There is a considerable demand for motor trucks of 1-ton and 2-ton capacity in the Calcutta consular district.

Estimated revenue under proposed English registration system

	No.	Fee	Revenue
I. *Private Vehicles.*			
Motorcycles	100,000	$15	$1,500,000
Motorcycles with side cars	100,000	20	2,000,000
Motorcars	210,000	25 (min.) ($3.60 per Hp.)	12,500,000
II. *Hackney Vehicles.*	No.	Fee	Revenue
Motor cabs	48,000	$75	$3,600,000
Motor buses (single decker)		200	
Motor buses (country districts)		300	
Motor buses (metropolitan and country borough districts)		400	
Total motor buses	7,000	...	2,450,000
III. *Commercial Vehicles.*	No.	Fee	Revenue
Parcel cars (three-wheelers)	4,000	$20	$80,000
Not exceeding 1 ton laden weight	30,000	80	2,400,000
Exceeding 1 ton, not exceeding 2 tons	12,000	100	1,200,000
Exceeding 2 tons, not exceeding 3 tons	20,000	120	2,400,000
Exceeding 3 tons, not exceeding 4 tons	15,000	140	2,100,000
Exceeding 4 tons	8,000	160	1,280,000
IV. *Sundries.*	No.	Fee	Revenue
For right to draw trailers	10,000	$25	$250,000
Steel-tired vehicles (not including tractors)	2,000	(double rates)	250,000
Road locomotives (tractor engines)	1,546	125	193,000
Driving licenses / Horse carriage licenses	.....	...	2,400,000
Total			$34,603,000
Add one-eighth for Scotland and Ireland			4,000,000
			$38,603,000

Would Exempt Export Firms from Taxation

WASHINGTON, Feb. 10—Legislation relieving American concerns organized for foreign business from domestic taxes was considered to-day by the House Ways and Means Committee, but no decision was reached.

It was urged in support of the legislation that foreign governments, competing for world trade, especially in the Orient, exempt their export and import trading concerns from various internal taxes. American concerns that are burdened by the income, excess profits, and other taxes, are placed at a serious disadvantage, it is urged, in competing for this foreign trade.

Red Arrow Seeks Site for New Truck Plant

LANSING, Feb. 9—The Red Arrow Motors Co., capitalized at $1,000,000, under Indiana laws, has elected officers with I. L. Stoney, of this city, as president. The first meeting of the new company was held at Ft. Wayne, Ind., at which an effort was made to bring the factory to Lansing, but it was decided to investigate three sites offered in other cities before making a selection. Louis O'Neil, head of the Commercial Service Co., of Lansing, was elected secretary and treasurer, and A. B. Bowman, vice-president. The company will build the Red Arrow, a four-wheel drive truck, designed by Stoney and Bowman.

January Production

(*Continued from page* 479)

were loaded on flats. The company resorted to driveaways in only a few instances where the destination was in nearby towns, chiefly where owners desired to drive the cars away.

Barley Motor Car Co. of Kalamazoo produced only about 100 cars in January, just one-half of the scheduled output. About 60 per cent of the working force were "flu" victims. The shortage in parts hampered the company and the freight shortage was declared to be only incidental in so far as new cars were concerned. The company expects January conditions to continue during February, but thereafter hopes to keep up to a production of 300 cars a month.

Willys-Overland Co. at Toledo has been sending away 200 cars a day under their own power. The Overland factory has been handicapped in freight both inbound and outbound, but managed to produce 13,060 during January. They are just getting started on the model 20-Knight, and there was practically no production in January.

Reo Motor Car Co. at Lansing, with 23 per cent of its employees off on account of the "flu," produced 3000 trucks and passenger cars in January. Of this number 50 per cent were sent overland. Reo has had trouble in locating their parts and further trouble in getting them to the factory.

W. A. Paterson Co. at Flint has been driving away practically all of its output for the last month. The company has some parts on the road which have been in transit six weeks. The tie-up however, appears to be easing up some. Thirty per cent of Paterson employees were off on account of the epidemic.

Buick Motor Car Co. at Flint is driving away an average of 200 cars a day. The company kept to schedule of 500 cars a day during January despite the fact that 15 per cent of the force was off on account of illness. Although experiencing much trouble in getting freight cars, the company is having little trouble on inbound business.

Grand Rapids to House New Tire Corporation

GRAND RAPIDS, MICH., Feb. 7—The Grand Rapids Rubber & Tire Corp., with a capital of $1,000,000 preferred stock, and 20,000 shares of no par common, has been organized to build tires in this city. L. A. Brown, formerly with the Mid-Continent Tire & Rubber Co., is president and general manager. M. J. Goldner, formerly with the Diamond Rubber Co., Goodrich, and the U. S. Tire & Rubber Co., will be secretary-treasurer, and H. H. Swan will be production engineer.

The company is negotiating for the purchase of a 24-acre site with 1,000,000 ft. of railroad siding, and plans already have been made for the buildings. One complete unit will be erected and additional units constructed as the increase demands. The company will produce high grade cord tires and inner tubes.

Bill Would Prohibit Helium Gas Exports

WASHINGTON, Feb. 9—A bill has been introduced into Congress which will prohibit the exportation of helium gas except by permission of the President. It also prescribes rules to govern the exportation of helium, and makes unauthorized exportation punishable by a fine of not less than $5,000, and a prison sentence. Helium gas is being used in dirigible airships and the greatest source of supply is in the United States, making this one of the most valuable military assets of the country.

PLANS NEW CLARK PLANT

CHICAGO, Feb. 6—Production of Clark axles and steel wheels for motor trucks will be greatly increased with the addition of a new manufacturing plant to be built by the Clark Equipment Co. at Battle Creek, Mich. Here a 23 acre plot with one-half mile of frontage on the main line of the Michigan Central Railroad and similar frontage on the Battle Creek & Interurban Line has been acquired.

The first buildings to be constructed will be 100 x 450 ft. and 50 x 450 ft., and a separate power plant and two story office building. The plans provide for a personnel of 500 men in the new plant, which will be devoted exclusively for the production of Clark axles.

Eaton Succeeds Girl in Standard Parts

Reorganization Planned—Eaton Axle Interest Acquired—New Girl Venture Expected

NEW YORK, Feb. 12—J. O. Eaton, president of the Eaton Axle Co., recently organized in Cleveland, has been elected president and general manager of the Standard Parts Co. to succeed Christian Girl. Eaton announced his acceptance yesterday.

Election of Girl's successor took place at a meeting of the Standard Parts Co. directors Monday. Girl was in New York to-day. It is said that strong financial interests here had expressed a willingness to back him in an independent venture.

Coincident with the election of Eaton to the presidency and the resignation of Girl came the report of a proposed reorganization of the Standard Parts Co. which includes the acquisition of a substantial interest in the Eaton Axle Co. by Standard Parts. Under this arrangement the Eaton Axle Co. will retain its identity, with Eaton as president. The combination is declared of great advantage to both companies, and it is said a merger plan is on foot, with a capitalization of $25,000,000—the largest in the country manufacturing axles, springs, bearings and rims. A syndicate of Cleveland financiers, headed by Otis & Co., is said to be behind the venture.

Eaton takes charge immediately. Girl's resignation, which was forecast in AUTOMOTIVE INDUSTRIES two weeks ago, was tendered at the Monday meeting.

The Eaton Axle Co., capitalized at $5,000,000, includes V. V. Torbensen, one of the founders of the Torbensen Axle Co. Work has been under way for more than a month on a plant for the Eaton Co., to cost in excess of $1,000,000. The factory is being built to produce 200 passenger cars and 100 truck axles daily. Eaton also was a former official of the Torbensen Co.

The elimination of Christian Girl as the Standard Parts Co. head was a distinct surprise to the industry. Under Girl's management the company had been built to its present size, and, although it was admitted that no money had been made last year, due to insufficient working capital, it was pointed out that there were orders on hand that meant immense profits. The last annual report indicated that the company was proceeding successfully and apparently had bright prospects.

Friends of Girl believe that his difficulties were purely financial and that the developments looking toward forcing him out were a syndicate plan to seize control of the valuable property developed by Girl.

Efforts to communicate with Mr. Girl in New York were unsuccessful up to press-time to-day.

Car Builders Plan Safe Glass Supply

Many Makers Reported in Field for Annexation of Glass Factories

DETROIT, Feb. 7.—Self-preservation has forced the automobile manufacturers into the plate glass field, and there is a wild scramble to get hold of glass plants. The recent announcement of the visit of Henry Ford and son, Edsel, to Toledo, where they inspected Edward Ford Plate Glass Co., and the report that the Ford Motor Co. would take over the plant, was followed by the announcement that the Fisher Body Corp. had taken over three plants in Saginaw, Mich.; Ottawa, Ill., and Blairsville, Pa.

The outlay for the three plants taken by the Fisher Body Corp. was close to $7,000,000, and the transaction was in cash. It became apparent to the Fisher company two years ago that closed bodies for automobiles soon would predominate. The matter of glass was the first limited feature in connection with closed body building. The fuel shortage, closing many of the glass plants, awakened the automobile industry to the necessity of protection in such an emergency.

An investigation by Fred Fisher resulted in the negotiation for the three plants. The Saginaw Plate Glass Co., the Columbia Plate Glass Co. at Blairsville and the Federal Plate Glass Co. at Ottawa combined give the Fisher corporation an output of 12,000,000 ft. of glass each year, insuring an adequate source of supply and eliminating fear of another shortage. Possession of the Saginaw and Ottawa plants was taken Feb. 4, and the Federal plant will be taken possession of within a few days.

All of the companies are being liquidated, and will be merged into the National Plate Glass Co., with executive offices and sales headquarters in Detroit. The output, while taking care of all demands of the Fisher Body Corp., will permit of the sale of a large quantity over and above their requirements.

It is the purpose to double production at the Federal plant, which lends itself to big expansion by reason of the fact that the plant's sand supply is close at hand. The Fisher Body Corp. is now building 600 closed bodies a day and 1000 open bodies. Production is expected to increase to 1000 and 1600 respectively by June 1.

Connecticut Plants Closed by Heavy Snow

HARTFORD, CONN., Feb. 9—For the first time in its history, the Hartford Rubber Works closed down for two days by reason of shortage of coal. About 1500 persons were affected by the tie-up which was occasioned by coal being delayed in transit owing to the severe snowstorms. Charles B. Whittlesey, president of the works, said that the company has outstanding contracts for coal and was prevented receiving a sufficient supply to keep the factory going by embargoes and the storms. It was deemed best to shut down for two days and conserve the supply on hand. The factory has been running to capacity.

Another angle on the severe weather is found in the experience of the New Departure Manufacturing Co., where a shut-down was occasioned by failure of the electrical current supplied by the Connecticut Light & Power Co.

Chase Resigns as S. A. E. Secretary

NEW YORK, Jan. 9—Herbert Chase, who for more than three years has held the position of assistant secretary of the Society of Automotive Engineers, has resigned to accept a position with the Power Plants Corp., a company organized to undertake engine development and other work of similar character.

Chase, in his new position, will design an engine of the constant pressure type for heavy fuel. He severed his connection with the S. A. E. early this month, and is at present at Washington. It is understood he will remain there temporarily and later return to New York.

Chase is widely acquainted in automotive circles and frequently has contributed to the transactions of the society papers and discussions on engines and engine testing.

Spain in Market for Many Motor Trucks

WASHINGTON, Feb. 7—There is a large demand for American motor trucks in the Province of Seville, Spain, according to a report received by the Bureau of Foreign and Domestic Commerce from Consul Harndon. Hauling by mule cart is the prevailing system there at present, and it is estimated that one motor truck could transport as much olives, cork, wine, etc., as ten mule carts, effecting a saving in time and labor, and assuring the shipper against the uncertainty and inconvenience of the present method, which, due to innumerable strikes of carters, has been found most unsatisfactory.

The local merchants have subscribed $250,000 for the purchase of American motor trucks, this amount to be doubled later on. Orders for 100 motor trucks have been placed with American dealers, but shipments are not arriving, and it is felt that unless something is done to facilitate deliveries, local dealers will be forced to buy in England or Germany as soon as it is possible for them to do so.

There are 978 automobiles in the Province of Seville, 32 motor trucks, 14 motor buses and 100 motorcycles.

REVERE PLANS EXPANSION

KOKOMO, IND., Feb. 6—Revere Motor Car Corp. has placed on the market $1,500,000 of its capital stock, with the proceeds of the sale of which it is proposed to erect large plant additions.

United Engineering Co. Builds New Chassis

GREENSBURG, IND., Feb. 7—A chassis built on contract only is being produced by the United Engineering Co., and is known as Model G-58. It is equipped with a 4 cyl. 3½ x 5 in. Herschell-Spillman engine, with 3 point suspension. The carbureter is the vacuum feed Carter make, with horizontal flange, side outlet and hot spot. Ignition is by means of a high tension Berling magneto exclusively. Starting and lighting are by the two-unit, 6-volt, Dyneto system, with ground return wiring and the Bendix starter drive. A Prest-O-Lite battery is used, with a capacity of 85 amp.-hr.

The clutch is the Borg & Beck single plate. A Muncie gearset is used, of the selective type, with three speeds forward and reverse. The final drive is by lateral bevel gears. There is a Peru rear axle, semi-floating, the axle ratio being 4½ to 1. The foot brake is external and the hand brake of the internal type. The wheels regularly supplied are wood, with the wire type optional. Tires are clincher, 32 in. x 4 in. A Stewart speedometer is among the stock equipment.

Build Oil Pipe Line from Havre to Paris

PARIS, Jan. 20 (*Special Correspondence*)—Owing to the urgency of getting fuel oil and gasoline supplies to Paris, orders have been given for work to start immediately on the construction of the 130 miles pipe line from Havre to Paris.

This work, which will cost $18,000,000, comprises a special dock at Havre and a 10 in. fuel oil pipe with five pumping and heating stations, the whole capable of delivering 4500 tons of oil per day. Above this line there will be a second pipe of 4-in. diameter for carrying kerosene. This will have an output of 1000 tons per day. The line will follow the route of the main road from Havre to Paris, passing through Bolbec, Yvetot, Baretin, Rouen, Pontoise. This work is being done by a private concern under authority from the French Ministry of Public Works; although the scheme has not yet been fully approved authority has been given to start work without delay.

Building Permits in Detroit Show Growth

DETROIT, Feb. 7—Building permits for January aggregated $5,658,830, as against $1,065,735 in 1919. New buildings erected totalled 536, and permits for alterations and additions to 150 were granted last month, against 224 new buildings and 119 alterations and additions last year.

Cadillac Motor Car Co. was granted a permit yesterday for the erection of a temporary one-story frame foundry, to cost $22,000.

Manufacturers Meet in Sales Conference

JOHNSTOWN, PA., Feb. 9—Manufacturers and others prominently connected with the automobile industries from various parts of the country attended the sales conference in session here last week. The meetings were being held at the quarters of the Johnstown Automobile Co. Two evening meetings were held, with entertainment as well as instructive features. The program for the three days follows:

Thursday—Weaver Manufacturing Co., garage equipment; Universal Tool Co., reboring tools; Imperial Brass Co., welding outfits with practical demonstrations of equipment; Brunner Manufacturing Co., air compressors; Temco Manufacturing Co., electric drills.

Friday—Bearings Service Co., Timken, Hyatt and New Departure roller bearings; Stewart-Warner Corporation, car equipment; Northwestern Chemical Co., Gates Manufacturing Co., fan belting and patches; Vacuum Oil Co., mobiloils; Johns-Manville Co., brake linings; Paul G. Niehoff & Co., contact parts and brushes.

Saturday — American Ever-Ready Works, flashlights; du Pont Chemical Co., Electric Storage Battery Co., Exide batteries; Packard Electric Co., electric cables; Jefferson Electric Co., replacement coils, and Klaxon Co., electric warning signals.

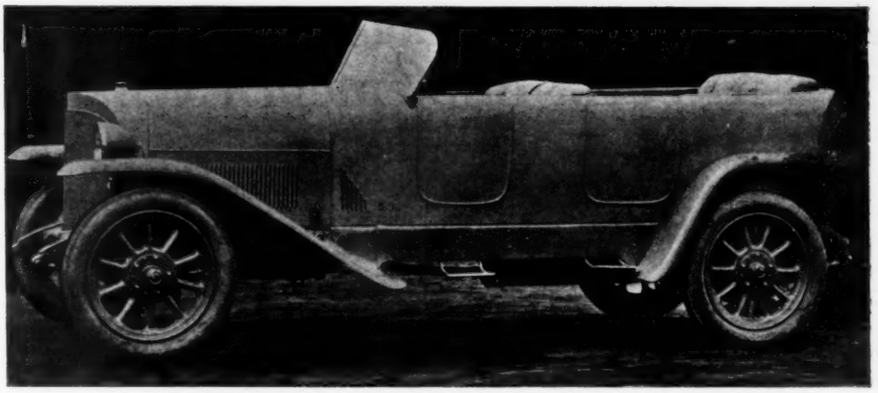
Philadelphia to Open Aircraft Show March 22

PHILADELPHIA, Feb. 9—On March 22, Philadelphia's Aeronautics Show of 1920 will open in the First Regiment Armory, Broad and Callowhill streets, in the heart of "Motor Row," to last until the 27th. It will be under the auspices of the Chamber of Commerce, the Franklin Institute, the Aviators' Club of Pennsylvania, the Aero Club of Pennsylvania, and other allied organizations. Major Charles J. Biddle, of Philadelphia, a member of the advisory committee of the show, announces that the organizations will try to "get the airplane industry established here, work for the establishment of air lines to nearby cities, establish a large municipal landing field and a force of aerial police."

To Show Commercial Plane at Indianapolis

INDIANAPOLIS, Feb. 6—Indianapolis has started to build its greatest motor car show, March 8 to 13, and even with the commodious quarters in the Manufacturers' Building at the Fair Grounds, there does not seem room enough to take care of the exhibits, according to the show manager, John B. Orman.

For the first time in the history of an Indianapolis show, aircraft will be exhibited as a commercial vehicle of the air, the Indiana Aviation Co. of Kokomo having arranged space for the "Oriole," one of the Curtiss models. The directors of the association voted to permit tractors in the show this spring. For a time it was questionable whether tractors should be a part of the Indianapolis show, but because many automobile dealers handle tractors, it was thought best to allow a certain space for the farm tractors and power farm equipment.



New Fiat six-cylinder 35-hp. fast sporting car on standard chassis, lightened. The features include a Vee radiator, disappearing top, Vee type windshield, door steps instead of running board, and Sankey detachable steel wheels

To Make New Motor Truck at New Orleans

NEW ORLEANS, LA., Feb. 9—The New Orleans Truck Manufacturing Co. has been organized by a group of New Orleans capitalists, and work has been started on the erection of a plant to manufacture motor trucks bearing the name of this city. The Southern States Securities Corp. is fiscal agent for the new company, which was organized by H. Conneke, president of the New Orleans Loan and Investment Company. Trucks are now being built in temporary quarters, and the first truck is to be on the streets by March 1. The permanent plant is rising on Carrollton Avenue, near the assembling plant of the Ford Motor Company.

Du Pont Gives $2,600,000 to Complete Highway

WILMINGTON, DEL., Feb. 7—Gen. T. Coleman du Pont has placed $2,600,000 in the Wilmington Trust Co. to be used in completing the boulevard which he is having constructed the entire length of the State of Delaware. This road, which will be over 100 miles long and will occupy a right of way 200 ft. wide, was started several years ago.

WANTS MOTOR APPARATUS

COLUMBUS, Feb. 9—Nathan McCoy, street cleaning superintendent of Columbus, has asked the city council for an appropriation of $50,000 to do away with horse-drawn wagons in his department. He reports that street cleaning can be done with motor-driven wagons and apparatus much more economically than otherwise.

Seek Factory Site for New Dupont Car

Labor and Housing Conditions in Wilmington Cause Change in Plans

WILMINGTON, DEL., Feb. 7—Representatives of the Dupont Motors Corp. are casting about for a permanent site upon which to locate its new factory for quantity production of the new Dupont car. Unfavorable labor and housing conditions have determined the company to abandon Wilmington, and to seek a site somewhere in this vicinity where these obstacles are not prominent. The town of Moore, Pa., 16 miles north of Wilmington, is regarded favorably.

In seeking a location the company is desirous of remaining in the Wilmington district, as it wishes the car to be known as a Wilmington product. Construction of show cars and experimental work on the models has been done in the plant of the Delaware Marine Motors Co., here, and this plant would be enlarged and production carried out there were it possibe to secure help, or find homes for help, were it imported.

The situation in Wilmington has been taken up by the Chamber of Commerce and an effort will be made to keep the industry in this city.

LATEX CAPITAL $500,000

FOND DU LAC, WIS., Feb. 9—The Latex Tire & Rubber Co., which is placing in operation the first unit of its new tire factory at Fond du Lac, Wis., has increased its authorized captial stock from $100,000 to $500,000 for the purpose of financing further units. A 2-story fireproof shop, 50 x 200 ft., duplicating the original factory, will be erected at once. F. S. Dannenberg, formerly of Akron, Ohio, is president and general manager.

LORAIN CO. CHARTERED

LORAIN, Feb. 9—The Lorain Machine & Auto Co. has been chartered with a capital of $230,000 by F. S. Naylor, J. E. Regal, C. W. Becker, E. F. Cheethal and H. Alexander.

Automotive Products Shown At Farm Implement Exchange

Tractors, Trucks and Trailers Hold Prominent Place in Permanent Exposition at Grand Central Palace—Show Attracts World-wide Attention

No longer is it necessary for the prospective purchaser of tractors, trailers and farm implements to travel the wide expanse of this country in search of the particular type of machine to meet his needs.

They have been concentrated on one floor of Grand Central Palace, in New York, as a part of the permanent International Exposition of Industries. Here representative makers have established showrooms in which their very latest products, as well as the old standard implements, are displayed.

The International Exposition of Industries was designed primarily to accommodate the foreign buyer, but it is proving equally interesting to the mid-western wheat grower, the Jersey truck farmer, and the Long Island commuter who measures his back-yard garden with a two-foot rule, and dreams of the day when he will buy a little farm, and retire.

Fills Long Felt Need

Although the exposition has been open only a few weeks, it has demonstrated that it is a successful venture and is filling a long-felt need.

The idea of the International Exposition of Industries originated with Alfred I. du Pont, Fred Payne, well known as a builder of expositions, Sylvester Sullivan, a promoter and publicity agent, and others. It began with the thought that New York should have a permanent exhibit to promote the sale of American manufactured products at home and abroad. The idea gradually crystallized into a policy of permanency, reliability and comprehensiveness, and this has been worked into the exposition plan with inspiring results.

Exhibitors Selected

In the case of the Tractor, Trailer and Implement Exposition, only the representative manufacturers in those lines were invited to exhibit. The manufacturers were required to guarantee their products, and in turn the Exposition company guaranteed the manufacturer. When the idea grew to the point of reality, S. H. Macsherry, vice-president of the Merchants' and Manufacturers' Exchange of New York, assisted in the initial financing of the plans. Exhibits began to arrive early in the fall, but it was not until late in December that the floors were completely filled and ready for the reception of prospective buyers.

In addition to the tractor, trailer and farm implement division there is a floor given over entirely to hardware and housefurnishing, and another to machinery, including mining machinery, factory appliances and material handling machinery.

The tractor, trailer and farm implement exhibit, which is situated on the seventh floor of the Grand Central Palace, is under the personal management of W. W. Mawby, a farmer and implement man of long standing, who is thoroughly familiar with this field and to whom was intrusted the selection of the exhibitors.

List of Exhibitors

Advance-Rumely Thresher Co., Inc.
Avery Co.
Bateman Mfg. Co
Bean Spray Pump Co.
Burnett-Larsh Sales Co.
Calhoun, Sands (representing King Ventilating Co.).
Case, J. I., Plow Works Co.
Chicago Steel Post Co.
Craine Silo Co., Inc.
The Deming Co.
Detroit Trailer Co.
Emerson-Brantingham Implement Co.
Fitzpatrick Products Co. ("K" stump puller.)
Frick Co., Inc.
Fruehauf Trailer Co.
The General Ordnance Co.
The Gray Tractor Co., Inc.
Hi-Speed Trailercar Co.
The Holt Mfg. Co.
International Harvester Co.
James Mfg. Co.
Hunt-Helm-Ferris & Co.
King Trailer Co.
Lansing, Charles (representing the Dauch Mfg. Co.).
The John Lauson Mfg. Co.
F. P. Lyons Iron Works.
Martin Rocking Fifth Wheel Co.
The Matthews Engineering Co.
McAdam & Sons.
Morris, Russell & Co., Inc.
New Britain Machine Co.
Ohio Trailer Co. of New York.
Rogers Bros. Co.
Sayer, Eugene Y. (representing Owen Farm Light and Dayton Pump & Mfg. Co.)
Tirrill Gas Machine Lighting Co.
Trailer Mfrs. Ass'n of America.
Traylor Engineering & Mfg. Co.
The Lovelace Tractor Co., Inc.

How well Mawby accomplished this task is shown in the accompanying pictures. The largest single exhibit is shown by the International Harvester Co. Here the vast line of this great concern is shown in its entirety, from the light hand tools of the city lot farmer to the great tractors, trucks and harvesters of the plains. This one exhibit is the greatest ever collected under one roof.

The J. I. Case Plow Works is represented by a fine display, including the four-wheel Wallis tractor. The Emerson-Brantingham Implement Co. and the Avery Co. have large spaces attractively occupied by their leading products. In fact, the list of exhibitors reads like a roll-call of the nation's representative makers of hand, horse-drawn and motor-driven farm implements.

A world-wide advertising campaign in the leading trade periodicals has borne fruit in the large number of foreign and domestic buyers who daily visit the exposition. The timely opening of the exposition has been a boon to the representatives of foreign governments that have appropriated billions for the reconstruction of war-devastated lands.

Representatives of numerous South American governments have found the exposition useful and reports of sales running into six figures have been made. In order to assist the exhibitors in making sales under the most favorable circumstances the tenth floor of Grand Central Palace has been converted into a motion pictures theater, where films made by the exhibitors, showing their various products in action, may be projected for the benefit of the purchaser, thus giving the exhibitors the opportunity to demonstrate their wares under ideal conditions.

The scheme works like this. A purchaser thoroughly examines the tractor or other implement on the floor, and its virtues are explained by a representative of the company. Then he is taken to the tenth floor, a film showing the particular implement in action is flashed upon the screen, and it performs for him. The signature of the buyer on the dotted line is usually a natural sequence. This motion picture theater is free to the exhibitors and buyers, and the exhibitor furnishes his own films.

As in similar expositions many of the companies occupying space have erected cozy little offices, in which the prespective buyer is entertained during his visit to that particular exhibit. Some of the exhibitors maintain a complete office force with an exhibit manager and the necessary clerical assistants, while others assign various salesmen to spend a week or more at the exposition in turn.

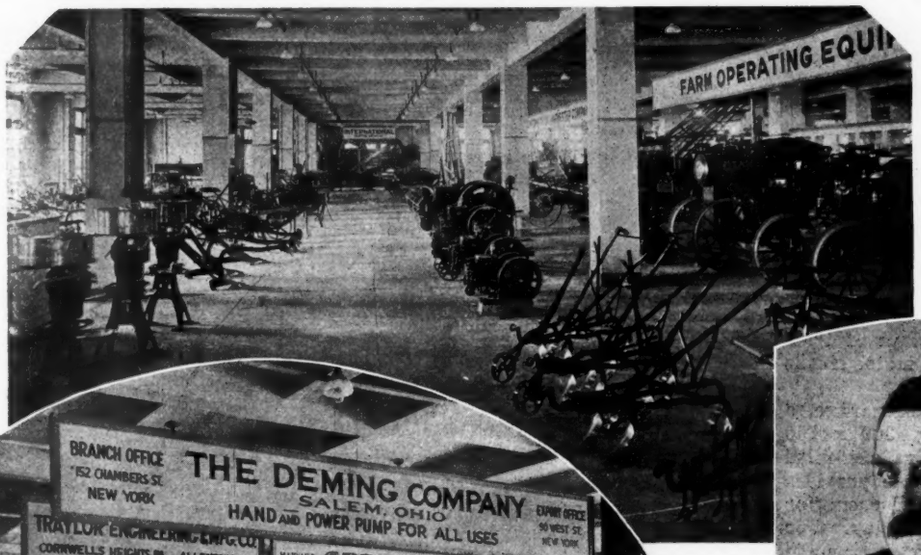
The Officers

The company operating the National Exposition of American Industries is known as the Merchants' and Manufacturers' Exchange. At a recent annual meeting of the company, S. H. Macsherry was elected president, and Fred Payne vice-president. L. A. De Cavenove was elected vice-president and treasurer, and J. M. Sanderson secretary.

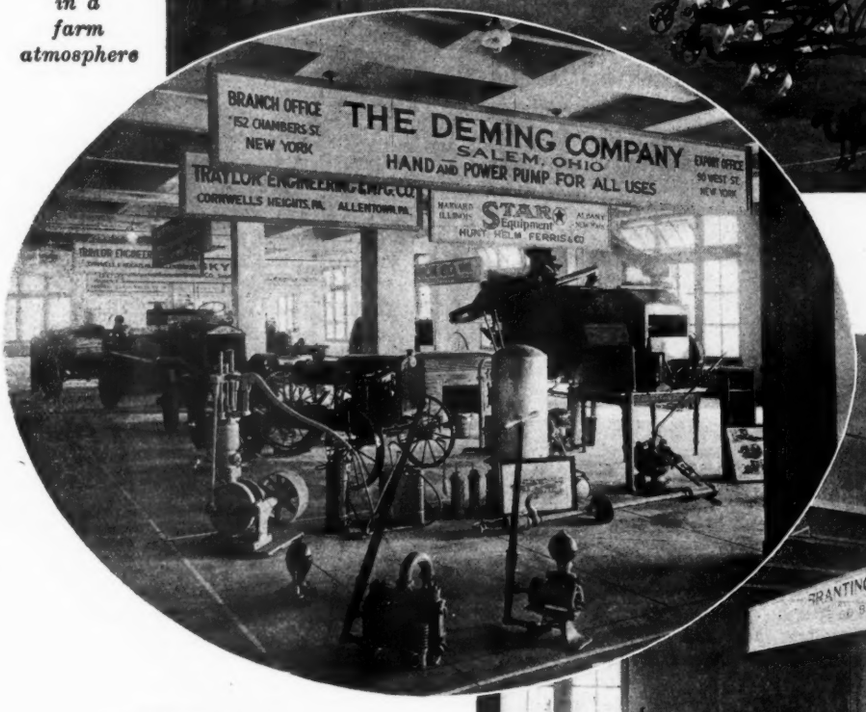
As a part of a nation-wide campaign to acquaint prospective purchasers with the exposition in New York a complete catalog of the exposition known as the Classified List of Products Directory has been prepared. This will be off the presses in a short time and will be sent broadcast to all persons and governments that may be interested in the products shown on the National Tractor, Trailer and Farm Implement floor as well as the others.

Glimpses of the Grand Central Palace Exposition

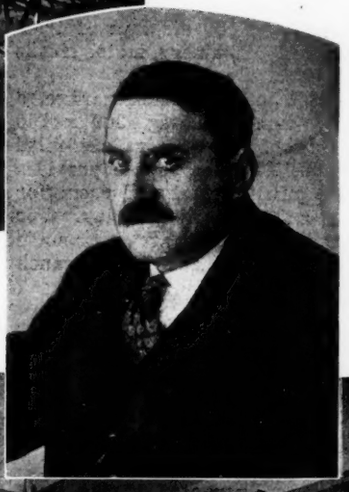
The International Harvester exhibit

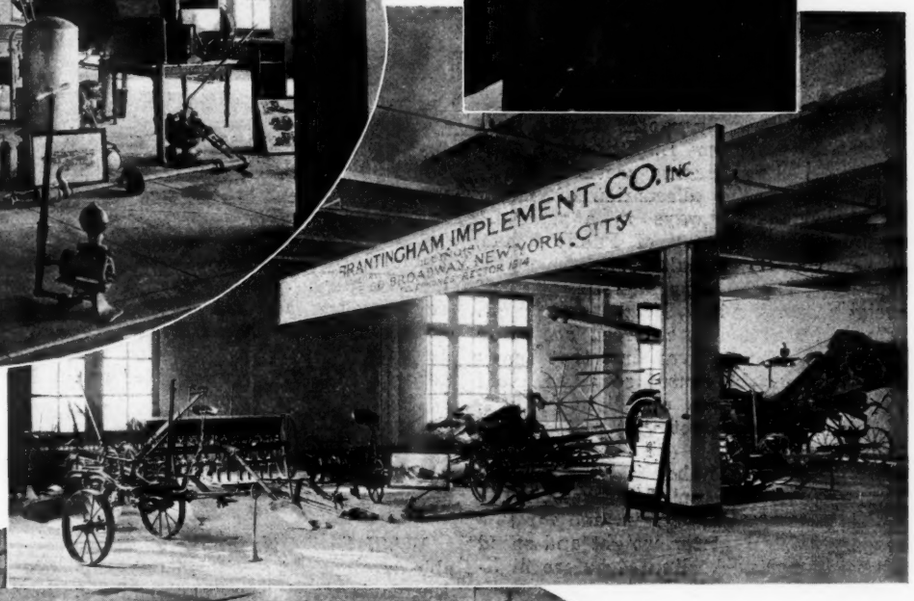


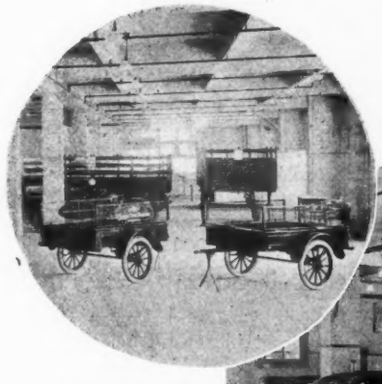
Traylor trucks and tractors in a farm atmosphere



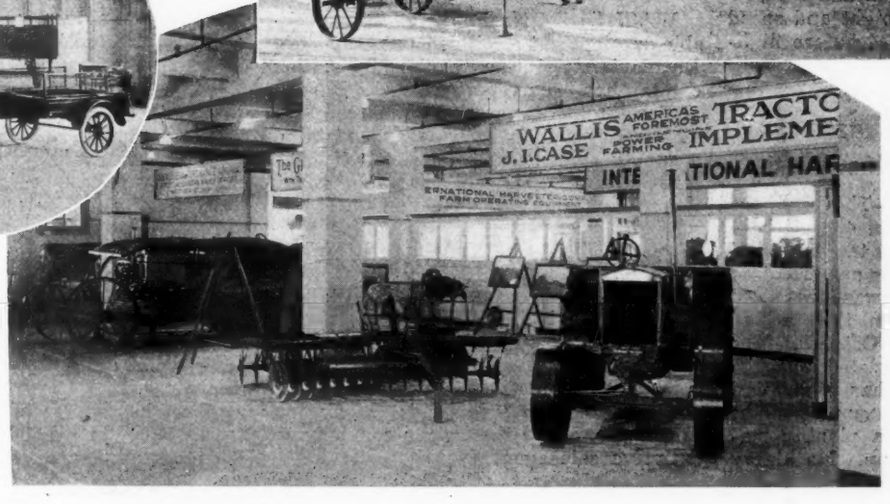
W. W. Mawby, exposition manager







A corner of the trailer exhibit



The Emerson-Brantingham and J. I. Case displays

Makers Exhibit 100 Models at Wichita

Big Tractor and Thresher Show May be Largest of Year

WICHITA, KAN., Feb. 9—Power operated farm equipment both of the drawbar and belt driven varieties is emphasized in the Midwest Tractor and Thresher Show, which opened here today. The display of threshing machines and combined harvesting and threshing machines is the largest the trade is likely to see this year. Also there is a varied display of power plows, listers and similar tools. The exhibit of disk plows is particularly comprehensive.

In all there are 100 displays of tractors, power farm machinery, motor trucks and tractor equipment.

The show is in the Forum garage, a municipally owned building, 300 x 600 ft. in dimension. Two floors are filled with exhibits. The floor space provides each exhibitor with plenty of room for an effective and attractive display. For the most part the exhibits are being made by Wichita and Kansas City branch houses.

Would Route Trucks To Preserve Highways

WASHINGTON, Feb. 10—That road-building is a constant evolution due to the increasing weights and sizes of vehicles and especially motor trucks, was stated by William D. Schier, former chairman of the Massachusetts Highway Commission, in a discussion of motor vehicles and highways in a pamphlet issued by the Bureau of Public Roads, Department of Agriculture.

Stringent regulation and limitation of weight, speed, width, height and length of vehicles should be enforced, according to Schier, who believes first that heavy trucks should be routed so as to avoid small country roads and light bridges. He points to the fact that motor truck hauls have increased 450 per cent in six years, and asserts that it is impossible for any rural community to furnish roads which can stand the strain, and for this reason claims that the weight and speed of trucks should be limited before highways are destroyed.

Northern Wheel Plant in Production Mar. 1

ALMA, MICH., Feb. 9—The Northern Wheel Co. expects to be in operation in its new factory in the next ten days, and deliveries of finished wheels are promised March 1. The company was organized last August and work on the factory buildings was started in October. The buildings have been completed and the installation of machinery has progressed to such an extent that the saw mill will be in operation as soon as a planing machine is received and set up. Machinery for the other departments of the plant has been installed or is on the ground, and will be in place within a few days.

The company has a three months' supply of hickory and oak lumber on the ground or in transit. Steel and lumber contracts sufficient to keep the plant running a year on a basis of 400 wheels a day assure ample material. Motor truck and trailer wooden wheels will be manufactured for the time being, but the company eventually will make steel and wire wheels also.

The company has an authorized capital of $1,000,000 common stock, approximately 20 per cent of which is held by local people. The main factory building is 60 by 324 ft., and includes eight dry kilns. Railroad spurs have been laid to the plant to facilitate the receipt and shipment of materials and finished wheels.

Japan Plans Trade Representation Here

WASHINGTON, Feb 9—Japan is planning to appoint two commercial attaches—one to the United States, whose office will be in New York City, and one to China, with office in Shanghai, according to a report received by the Bureau of Foreign and Domestic Commerce. The appointment will depend upon the passing by the Diet of the new budget for 1920, which has just been announced.

Blériot Passenger Plane Fails in Test

PARIS, Jan. 28 (*Special Correspondence*)—The Blériot "Mammoth" 28-passenger airplane crashed while undergoing its test at Buc, near Paris.

This machine was exhibited at the Paris Aeronautical Salon and was the biggest airplane constructed in France. It was equipped with 4 Hispano-Suiza engines of 200 hp. each. The test pilot, Bernardot, who was alone on the machine at the time, was killed when it crashed to the ground.

Report Plan to Open Argentine Oil Fields

WASHINGTON, Feb. 10—The probable development of oil fields at Comodoro Rivadavia, Argentine Republic, by British capital, has been reported by the Bureau of Foreign and Domestic Commerce. The oil area is said to be wide and contains a supply capable of being exploited for many years. This will favorably affect Argentine industrial development.

WHEEL CONTRACT CLOSED

LANSING, Feb. 9—The Dail Steel Products Co. has just closed a contract with the Peerless Products Co., of Toledo, for the manufacture of $100,000 worth of demountable wheel parts, for the Toledo concern. The new device is chiefly for Ford motors, and the Toledo company is exclusive salesagent.

Auto Body Co. Shows Big Gain in Assets

DETROIT, Feb. 9—The Auto Body Co. list assets of $2,340,216.39 in the balance sheet for 1919, filed with the Detroit Stock Exchange. This is an increase from $1,731,107.93, in the preceding yearly report.

The company shows operating profits of $163,808.37 and $3,804.89 additional profit from preferred stock conversion; the total comparing with a deficit of $84,639.19 at the close of the previous year. After making good this deficit, and providing for a dividend payment on the preferred stock last August, the net profit for the year shows a balance of $76,212.83, from which $24,500 was appropriated to meet federal income and excess profits tax. This leaves a surplus of $51,712.83, approximately 5 per cent on the company's outstanding common stock.

Current assets total $1,212,708.04, as compared with $566,437.06 at the end of 1919. Current liabilities were $714,003.56, against $713,881.58. Net working capital aggregated $498,704.48 in contrast with a deficit last year. Fixed assets were $1,090,743.06, an increase from $1,084,-587.74. The capital stock was increased from $1,000,000 to $1,600,000 of common, by the addition of $600,000 preferred. Of the former, $1,017,400 and of the latter $527,600 was outstanding Dec. 31. The company retired $17,400 of preferred stock by conversion to common stock.

To Vote on Goodrich Stock Plan Mar. 10

NEW YORK, Feb. 7—Stockholders of the B. F. Goodrich Co., at a special meeting March 10, will be asked to approve the new financing plan in which it is proposed to change the present $16,000,-000 of $100 par common stock, to no par value shares, and to increase the number of shares of common stock so as to provide for the conversion of notes and also a new issue of common shares to be made available for purchase by the company's employees.

A group of bankers headed by the Guaranty Trust Co. has underwritten the $30,000,000 five year 7 per cent convertible gold notes authorized at a special meeting directed in Akron last Saturday.

Increased Prices on Hupp Models in Effect

DETROIT, Feb. 7—Hupp Motor Car Corp. put into effect increased prices for all models of Hupmobiles, Tuesday. The new price for open bodies is $1,550 and for closed cars, $2,285.

WETMORE ADDS TO CAPITAL

MILWAUKEE, Feb. 9—The Wetmore Reamer Co., Enterprise Building, Milwaukee, has increased its capital stock from $35,000 to $75,000. It manufactures tools and appliances.

Theodore Douglas Dies; Was Duplex Inventor

NEW YORK, Feb. 5—Theodore Douglas, president of the Duplex Engine Governor Co., Brooklyn, died Jan. 21 after an illness of approximately four months at his home in Scarboro-on-the-Hudson.

He was the inventor of the Duplex governor and was largely responsible for the commercial and engineering success of the Duplex Governor company.

There were many other inventions which he developed and perfected and for which he achieved considerable credit. The last invention marketed was an automatic airplane interrupter. This was developed as a war device and used on airplanes as an ignition cutoff of the engine.

Douglas was originally a mining engineer and traveled in Europe, Africa, Central America and the United States for different American interests. He was a Yale graduate and was connected with many prominent engineering and educational societies throughout the country.

Detroit Products Co. Plans Sales Increase

DETROIT, Feb. 9—Reports presented at the annual meeting of the Detroit Steel Products Co. this week indicate the output sold well into 1920. Completion of the addition to the spring shop, now under construction, will make the company the largest producer of automobile springs in the country, as well as the largest steel window sash manufacturing concern in the world.

Directors were elected as follows: John G. Rumney, Victor F. Dewey, Leo M. Butzel, Henry Russel, Mason P. Rumney, R. S. Drummond, H. F. Wardwell, A. L. Baldwin and Edgar R. Ailes.

The following officers were re-elected: President, John G. Rumney; vice-president and general manager, Victor F. Dewey; assistant general manager, Mason P. Rumney; secretary, H. F. Wardwell; treasurer, Edgar R. Ailes; production manager, A. L. Baldwin.

Pennsylvania Plans 800 Miles of Roads

HARRISBURG, PA., Feb. 9—Construction of 800 miles of durable highways in various sections of Pennsylvania is planned for 1920 by the State Highway Department. Most of the new mileage is located on what is known as the primary system, or through highway routes. It is the intention of Governor Sproul and the department to complete the state's primary system as soon as possible.

BRANCH MANAGERS NAMED

NEW YORK, Feb. 7—The appointment of three branch managers of the Bearings Service Co. at Chicago, Philadelphia and Cleveland has just been made. L. R. Remington, who has been manager of the Philadelphia branch, has been transferred to Chicago, where he will manage the branch in which he received his early training. He will be succeeded in the Philadelphia branch by J. A. Barnett, who has been assistant branch manager there. F. C. Fuller, who has been traveling out of the Detroit branch of the company, has been appointed manager of the Cleveland branch.

To Race Light Cars

PARIS, Jan. 23 (*Special correspondence*)—With a total cylinder area of only 85 cu. in., an international light car race will be held near the town of Le Mans on Aug. 29. This race, which will be open to all but the late enemy subjects, will be for a distance of about 250 miles. It is the smallest car race ever held in France.

Manufacturers Enter Cars in Glidden Tour

NEW YORK, Feb. 9—More than a dozen automobile manufacturers have notified the American Automobile Association that they will enter stock cars in the National Reliabiltiy Tour for the Glidden Trophy, which will be run from New York to San Francisco, probably over the Lincoln Highway. Several others have promised to support the project.

The definite date for the start has not been set, but it is understood that it will be about Sept. 1.

The entry blanks have been in circulation but a short time, and the contest board is well pleased with the early responses.

The committee in charge of the tour includes: R. Kennerdell, chairman; S. A. Miles, Alfred Reeves, Robert Wolfers, W. E. Metzger, C. G. Sinsabaugh and E. S. Hare.

Receiver Named for Warm-U-Heater Co.

COLUMBUS, OHIO, Feb. 9—Boyd B. Haddox has been appointed receiver for the Warm-U-Automobile Heater Co., upon application made by a number of stockholders, claiming mismanagement of the company. The concern manufactured automobile heaters.

TO EXTEND PISTON PLANT

JACKSON, MICH., Feb. 7—Extensive improvements are planned by D. E. Creech, piston ring manufacturer, at 100 Union Street. Although Creech has been in business but a year, demand for his product has increased rapidly, and the business has outgrown present factory space.

TO DOUBLE BODY OUTPUT

DETROIT, Feb. 6—Plans are under way by the C. R. Wilson Body Co. for doubling its output of car bodies, which is at present 750 a day.

Gas Prices Hurt British Car Trade

New Increases Threaten Curtailment in Use of Automobiles and Trucks

LONDON, Jan. 25 (*Special Correspondence*)—Great consternation has been caused in motor circles in Great Britain by the intimation that petrol, which is now 3s. per gallon, is to be advanced 7d. per gallon in a week's time. The assertion that the rise is made necessary by high freights and the adverse American exchange has been met by loud outcries against the high dividends and bonuses being paid by many oil companies.

The Shell Transport and Trading Co. made in 1918 a profit of nearly $12,000,000, paid a dividend of 35 per cent, free of taxation, and carried to reserves a sum greater than its profits in 1912. The shares of this company have been watered freely and are much above par. The Mexican Eagle Co. has advanced its rate of dividend from 16 to 45 per cent. Other companies have increased their dividends largely and given share bonuses, equivalent to the watering of capital.

But outcries of this sort do not remove the shortage of petrol. There is no reason to believe that this shortage can be removed for several years. The number of tank steamers available for the carrying of oil has been seriously reduced, and freight rates are high.

The real fact seems to be that there is a world shortage of petrol. At least there is a scarcity, made greater by the mounting output of automobiles. This sinister fact is made more serious to the British user of petrol by the fact that the large oil supplies are outside the British Empire, and the cost of petrol will be governed, therefore, by forces over which he has little control.

The situation is really serious for the British user of automotive machines. The oil wells of England are a fiction. The shale fields of Scotland do not yield any appreciable amount. The quantity of benzole available at present is 20 million gallons, as compared with 240 million gallons of petrol annually consumed, and cannot reach more than 17 per cent of the country's need for motor fuel, no matter what is done to increase its production.

Power alcohol is neglected in a country where the drink trade has blinded the eyes of the people to industrial foreshadowings. Concentrated alcohol has been proved to be applicable to a petrol engine if mixed with benzole, but this has received little attention.

The increase in the price of petrol is equal to a levy of $35,000,000 on the British motor industry, and must inevitably retard its progress at a moment when the return of the molders to work has removed one of the great obstacles to its advancement.

ENGLISHMAN.

Exports for 1919 Ascend to Total of $194,551,511

	Cars		Trucks		Parts
	No.	Value	No.	Value	Value
1919	67,085	$73,650,427	15,569	$35,385,069	$42,562,186
1918	36,936	36,278,292	10,308	26,814,952	33,607,050

	Motorcycles		Gas Engines	Airplanes		Parts
	No.	Value	Value	No.	Value	Value
1919	24,481	$6,687,436	$32,801,867	44	$215,300	$13,249.226
1918	9,212	2,169,385	34,713,471	48	607,255	14,670,289

WASHINGTON, Feb. 6.—Automotive exports for the calendar year 1919 —not including tires but including passenger cars, trucks, parts, motorcycles, airplanes and gasoline engines—reached the huge total of $194,551,-511, an increase of almost forty-six millions over the preceding year, 1918, and setting by far the highest twelve-month period in the history of the industry. The 1918 totals were $148,860,674.

These figures have just been announced here and may be considered official. They reveal, only in part, the world-wide demand for American-made cars and equipment, the calls for which may be said to have rolled up from every corner of the globe. Officials of the Bureau of Foreign & Domestic Commerce believe that this total would have been much greater had American factories been able to fill all the requirements of the greedy world. But lack of production and unfavorable exchange rate have held the record down.

The year's figures were announced in connection with the detailed exports for December and contrasted the totals for 1919 with those of 1918. These show that passenger car exportation, as had been expected, was more than double that, in point of value, of the earlier year, the total for 1919 being in excess of $73,000,000. The value of the parts exported gained practically $10,000,000 during the year, while that of trucks was only somewhat less. Motorcycles more than tripled in value, reaching a suprising total and showing the high aspects of the industry. The changes in the war situation, however, were reflected in the takings of gasoline engines and of airplanes, both of which showed a drop for the latter year.

Calendar year totals of previous years were not available for further comparisons, as previous quotations have shown those for the fiscal years that ended the twelve month periods at June 30, instead of at December 31, as in this instance. However, comparisons on that basis indicate the growing figures of the American car trade to foreign countries. The fiscal year 1914, which closed just prior to the opening of the world war, had car exportations of roughly $25,000,-000, practically a third of that for the calendar year of 1919, while the fiscal year total of 1917, the largest previous period, showed $48,612,632. The fiscal year of 1919, which ended June 30, last, showed $43,671,084, indicating the swing upward of shipments in the latter months.

The heaviest taker of passenger cars from this country during 1919, as might have been expected, was Canada, with Great Britain, Australia, British South Africa, New Zealand, Cuba, Mexico, British India, and Denmark following in the order named. France, with importations of 3521 American-made trucks took more than one-fifth of the year's total, and was by far the largest buyer, Canada, Great Britain, and Cuba coming next.

The monthly totals for December and November also have been made public and are given here, in connection with more detailed figures. They follow:

	Cars		Trucks		Parts
1919	No.	Value	No.	Value	Value
December	7213	$8,013,973	1465	$2,459,685	$4,996,638
November	7863	8,177,728	1712	3,143,351	3,644,460
October	7898	8,634,965	1301	2,931,204	3,525,029
1918					
December	1703	2,203,027	896	2,636,689	2,191,511
November	2226	2,576,622	974	2,709,362	2,166,719

Exports of Automotive Equipment for December and Twelve Months Ending December, 1919

	1918		1919		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	...	.....	8	$59,100	48	$607,255	44	$215,300
Airplane parts	...	$424,784	....	237	.....	14,670,269	.....	3,249,226
Commercial Cars	896	2,636,689	1,465	2,495,685	10,308	26,814,952	15,569	35,385,069
Motorcycles	481	114,405	2,318	631,631	9,212	2,169,385	24,481	6,687,436
Passenger cars	1,703	2,203,027	7,213	8,013,973	36,936	36,278,292	67,085	73,650,427
Parts, not including engines and tires	...	2,191,511	....	4,996,638	.....	33,607,050	.....	42,562,186
ENGINES—								
Automobile, gas	1,777	332,112	2,505	387,490	30,813	4,188,675	31,358	4,738,341
Marine, gas	499	250,127	389	175,883	5,483	2,790,833	10,479	4,362,649
Stationary, gas	1,222	219,670	2,001	266,485	26,609	3,332,184	25,899	3,671,905
Tractor, gas	1,724	1,354,221	1,617	1,298,500	23,413	24,401,779	20,586	20,028,972
Total	5,222	$2,156,130	6,512	$2,128,358	86,318	$34,713,471	88,322	$32,801,867

FOREIGN OPPORTUNITIES

WASHINGTON, Feb. 7—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity number.

A fruit company in Honduras desires to purchase tractors for farm work. Quotations should be given f.o.b. New Orleans. Payment cash. 31930.

A firm in Norway desires to purchase automobiles and bicycles and their accessories, trucks, tractors, motorcycles and accessories. Quotations should be given c.i.f. Norwegian port. Payment through banks in Norway and in New York. References. 31943.

A firm in India desires to purchase or secure exclusive agency for the sale of medium-priced motor cars, 1½-ton to 3-ton motor trucks and automobile accessories. Quotations should be given f.o.b. American port. Payment, bank credit in New York against documents. Reference. 31948.

A sales company in Egypt desires to purchase and secure an agency for motorcycles. Quotations should be given c.i.f. Alexandria. Payment, cash against documents. References. 31953.

A member of an American firm has recently returned from Europe and desires to secure an agency for a firm in Holland for the sale of motorcycles, bicycles, accessories, tires and tubes. Quotations should be given f.o.b. New York. Payment cash against documents. References. 31954.

A merchant in Madeira desires to purchase and later secure an agency for the best and medium grades of cord tires for automobiles, sizes 815 by 105 mm., 10 of each for the first shipment. Quotations should be given c.i.f. Liverpool, Lisbon, port of Madeira or f.o.b. New York. Terms, generally three months' credit. Correspondence may be in English. References. 31969.

TIRE EXPORTS, $20,000,000

AKRON, OHIO, Feb. 9—Officials of the tire companies in Akron predict an export business of $20,000,000 during 1920, a great portion of which will be destined to Germany. Agents, who are contracting for tires, represent themselves as appearing for firms in Switzerland and Denmark, but make no secret of the fact that production eventually will reach Germany.

HALLADAY PLANS GROWTH

ATTICA, Feb. 9 — Extensive improvements and additions will be made to the plant of the Halladay Motor Corp. Recently steps were taken to increase the authorized capital of the company from $300,000 to $1,500,000. Plans for the additions will soon be announced.

Plan Mail Plane for Flight Over Rockies

WASHINGTON, Feb. 9—An appropriation of $3,400,000 for the establishment of new aerial mail routes between New York and San Francisco, Pittsburgh and Kansas City, Detroit, Toledo and Cleveland; New York, Washington and Atlanta, and St. Paul, Minneapolis, Chicago and St. Louis was asked of the Senate Post Office Committee to-day by Otto G. Praeger, second assistant postmaster general. In addition, Praeger requested that other items of the regular postal appropriations be made available for next year for contracts with private concerns to carry mail by airplane on branch routes between less important points.

A powerful type of mail plane equipped with two 300 hp. Hispano-Suisa engines is now being developed to carry the mail over the mountains on the San Francisco route, Praeger told the committee. Standard mail planes equipped with Liberty motors are not capable of attaining sufficient altitude to make flying over the mountains safe as a commercial proposition, he said.

PLANS HUGE FREIGHT YARD

AKRON, OHIO, Feb. 9—The freight congestion and lack of cars, which so greatly handicapped manufacturers all over this section of the country, has resulted in a plan by the Goodyear Tire & Rubber Co. to establish a yard, where it can house 350 freight cars. Permission has been asked of the city council for the right to build a switch to connect with the yard.

Exports by Countries for December and Twelve Months Ending December, 1919

	Cars		Trucks		Cars		Trucks	
	No.	Value	No.	Value	No.	Value	No.	Value
Denmark	95	$144,509	....	.....	2,519	$2,961,948	.....	.....
France	62	96,779	68	$326,243	866	1,999,773	3,521	$15,143,226
Norway	46	52,553	....	.....	1,835	2,355,339	....	.....
Russia in Europe	15	7,246	1	503	17	8,426	2	2,503
Spain	271	297,737	....	.....	1,462	1,763,295	.....	.....
United Kingdom	1,068	199,842	392	553,003	6,089	6,505,541	907	1,364,302
Canada	445	644,765	128	215,969	8,822	9,389,320	1,858	2,896,325
Mexico	277	260,671	....	.....	2,850	2,360,346	.....	.....
Cuba	499	481,723	109	259,031	2,887	3,121,228	899	1,915,141
Argentine	284	307,882	3	3,651	2,202	2,711,232	145	291,430
Chile	11	28,261	.....	.....	454	700 997	.....	.....
Uruguay	182	174,993	....	.....	1,844	1,757,623	.....	.....
British India	548	582,822	....	.....	2,624	2,891,943	.....	.....
Dutch East Indies	123	181,981	....	.....	1,820	2,377,241	.....	.....
Russia in Asia	...	.....	7	20,565	49	52,145	21	41,482
Australia	590	605,711	....	.....	3,905	4,016,751	.....	.....
New Zealand	476	542,507	....	.....	2,959	3,314,891	.....	.....
Philippine Is.	127	149,506	....	.....	2,381	2,629,348	.....	.....
Br. So. Africa	329	355,409	....	.....	2,959	3,412,230	.....	.....
Other countries	1,765	1,899,076	757	1,116,720	18,541	19,320,810	8,216	13,730,660
Total	7,213	$8,013,973	1,465	$2,495,685	67,085	$73,650,427	15,569	$35,385,069

Exports of Automotive Equipment for November and Eleven Months Ending November, 1919

	1918		1919		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes	19	$189,000	1	$3,000	48	$607,255	36	$156,200
Airplane parts	...	3,083,275	....	77,706	....	14,245,485	....	3 248,989
Commercial cars	974	2,709,362	1,712	3,143,351	9,412	24,178,263	14,079	32,830,469
Motorcycles	657	165,400	2,884	790,289	8,731	2.054,980	22,163	6,055,805
Passenger cars	2,226	2,576,622	7,683	8,177,728	35,233	34,075,265	59,872	65,636,454
Parts, not including engines and tires	...	2,166,719	....	3,644,460	....	31,415,539	....	37,563,552
ENGINES—								
Automobile, gas	2,715	$357,402	2,921	$393,988	29,036	$3,856,563	28,854	$4,352,520
Marine, gas	625	242,316	567	209,060	4,984	2.540,706	10 083	4,186,071
Stationary, gas	1,725	255,064	2,720	298,395	25,387	3,112,514	23 899	3,405,430
Tractor, gas	749	363,418	994	982,901	21,689	23,047,558	18,970	18,730,544
Total	5,814	$1,718,200	7,202	$1,884,344	81,096	$32,557,341	81,806	$30,674,565

Exports by Countries for November and Eleven Months Ending November, 1919

	Cars		Trucks		Cars		Trucks	
	No.	Value	No.	Value	No.	Value	No.	Value
Denmark	127	$213,466	....	.....	2,424	$2,817,439	.....	.....
France	176	178,610	261	$893,819	804	1,902,994	3,453	$14,816,983
Norway	253	337,748	....	.....	1,789	2,302,786	.....	.....
Russia in Europe	...	.....	....	.....	2	1,180	1	2,000
Spain	69	104,094	....	.....	1,191	1,465,558	.....	.....
United Kingdom	1,221	1,309,676	318	483,458	5,021	5,305,699	515	811,299
Canada	774	922,139	133	219,278	8,377	8,744,555	1,728	2,675,104
Mexico	322	287,047	....	.....	2,573	2,099,675	.....	.....
Cuba	372	373,955	95	148,131	2,388	2,639,505	767	1,602,447
Argentine	298	309,851	4	21,066	1,918	2,403,350	142	287,779
Chile	1	2,500	....	.....	443	672,736	.....	.....
Uruguay	350	242,460	....	.....	1,662	1,582,630	.....	.....
British India	228	268,436	....	.....	2,076	2,309,121	.....	.....
Dutch East Indies	74	98,407	....	.....	1,697	2,195,260	.....	.....
Russia in Asia	....	.....	5	5,077	49	52,145	14	.....
Australia	393	379,388	....	.....	3,315	3,411,040	.....	.....
New Zealand	226	275,363	....	.....	2,483	2,772,384	.....	.....
Philippine Is.	250	251,407	....	.....	2,254	2,479,842	.....	.....
Br. So. Africa	449	512.674	....	.....	2,630	3,056,821	.....	.....
Other Countries	2,100	2,110,507	896	1,372,522	16,776	17,421,734	7,459	12,613,940
Total	7,683	$8,177,728	1,712	$3,143,351	59,872	$65,636,454	14,079	$32,830,469

May Order Fenders for New York Trucks

Board of Aldermen Have Ordinance Designed to Protect Pedestrians

NEW YORK, Feb. 10—Truck operators here are beginning to wonder if they soon will have to equip their commercial vehicles with cowcatchers.

They see a trend in that direction in the ordinance now being considered by the board of aldermen which provides for fenders to replace the bumpers on motor trucks.

Of course, there will be serious opposition from the various automobile trade associations—necessarily serious because some of the aldermen seem serious in their desire to pass this latest form of "legislation."

The ordinance provides that no type of fender shall be approved by the commissioner of licenses unless it has been subjected to the tests prescribed in the ordinance. There are a number of "specifications." One is that the maximum projection in front shall not be more than 18 inches. It must not extend on either side beyond the outer rim of the wheels, and the height to the right and left must be "such as to prevent a person struck from coming in contact with the vehicle." Other specifications are that if wire is used the net must be 3½ inches from tip to tip. The width of the basket or shelf for picking up persons shall be at least 18 inches.

The ordinance further provides that any person who desires to have a fender tested must fill out a formal application and deposit $200 with the commissioner "to cover the expense of such test." Likewise, he must furnish full specifications, blueprints, drawings, photographs, etc.

Twenty-four "tests" are prescribed. The fender-equipped trucks would be expected to successfully "pick up" mannikins representing persons of various sizes and weights, the object being to imitate almost every conceivable kind of accident.

And then, if they are "approved," the truck operator gets a name plate "Approved by the City of New York"—for $1.

There is a provision in the proposed ordinance under which violators may be fined from $25 to $200.

Harry T. Gardner, executive secretary of the New York Automobile Dealers' Association, has called attention of the members to the proposed ordinance in a bulletin issued recently.

LORRAINE GETS CHARTER

MILWAUKEE, Feb. 9—The Lorraine Motors Corp., a Delaware concern capitalized at $1,500,000, has been granted a charter to do business in Wisconsin as a foreign corporation. The application states the Wisconsin interest to be $200,000.

To Double Production of New Dixie Flyer

LOUISVILLE, KY., Feb. 9—Two new buildings, costing approximately $150,000 and representing a substantial increase in floor space, are nearing completion at the plant of the Kentucky Wagon Manufacturing Co. They will enable the local concern to handle the increased production of Dixie Flyer passenger cars. The new structures will be used as an assembly plant.

Orders aggregating 2522 cars, with definite shipping dates and cash deposits, were received during the first five days of the Chicago show. The New York distributer placed specifications and gave specific shipping dates for 800 cars. He also arranged for express shipment of the Chicago show models for his New York showrooms on Broadway.

Robert V. Board, president of the company, has wired from Chicago to speed production, and pointed out that the necessity of doubling the number of cars scheduled for the year was apparent. The company has purchased material for 5000 cars, which is being delivered rapidly.

Orders for 1165 cars already have been accepted for foreign shipment. These are for distribution in the Britsh Isles, France, Africa, India, and Scandinavia.

Goodyear Minimum Day Wage Is Raised

AKRON, OHIO, Feb. 7—Beginning Mar. 15, the minimum wage for men in the Goodyear Tire & Rubber Co. plant will be $6 a day and $4 for women. The plan applies to persons employed continuously six months or more, and affects 25,000 to 30,000 workers. In addition to establishing a minimum wage, the company has announced an increase on hourly and piece work rates.

VAN BRIGGLE CO. MOVES

INDIANAPOLIS, Feb. 6 — The Van Briggle Motor Device Co., manufacturers of the Van Briggle carbureter and the Van Briggle shock absorber, have moved into the new factory building on N. Capitol Avenue. Production is going along in their new home. The work of removal was so well organized that it was done in 24 hours. The Van Briggle Co. has recently paid an extra dividend in addition to its regular one.

REORGANIZE MARVEL CO.

KEWAUNEE, WIS., Feb. 9—The Marvel Motor Works of Kewaunee, Wis., has been taken over by new interests represented by Carl Hartmann of Green Bay, Wis., and is being reorganized as the Kewaunee Machine Co. The new owners will continue to manufacture gas engines and automotive parts and do other commercial machine work as well as render service on trucks, tractors, power farm machinery, etc.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Indiana Truck Takes Over Rutenber Models

CHICAGO, Feb. 7—A deal has been consummated whereby the Indiana Truck Corp., Marion, Ind., has taken over the Rutenber Motor Co., models 38 and 40, and will produce these engines for its own use. Rumors have been in circulation regarding the sale of the Rutenber properties but the Indiana Truck announcement is the first confirmation of these reports.

City Aids Parts Co. to Establish Plant

CADILLAC, MICH., Feb. 7—The city commission has approved the lease to the Cadillac Metal Parts Co. whereby this corporation secures a new factory site, and will commence building within 60 or 90 days. The company asked the lease with the stipulation that at such time as it expends $50,000 for labor it shall be given a warranty deed for the land.

The company will manufacture tanks, hoods, and fenders.

TO MAKE RUBBING MACHINE

SYRACUSE, Feb. 7—The Franklin Products, Inc., of Syracuse, N. Y., was recently incorporated with various officials of the Franklin Automobile Co. as officers and directors. S. E. Ackerman, salesmanager of the automobile concern, will act as president. The new company has taken over separate quarters of its own in the plant formerly occupied by the Central City Wheel Works and will proceed at once with the manufacture of the Brown rubbing machine, the invention of Spencer Brown, long identified with experimental work at the Franklin factory. The machine is designed to supplant hand rubbing in paint shops.

CASE INSTRUCTS DEALERS

COLUMBUS, Feb. 9 — Dealers under the supervision of the Columbus branch of the J. I. Case Threshing Machine Co. met in Columbus recently for a course of instruction in merchandising farm power machinery. Five lectures constituted the course. The course was conducted by J. C. Thorpe, a representative of the company.

DODGE TO BUILD TUNNEL

DETROIT, Feb. 7 — Dodge Brothers were granted a permit this week for the construction of a reinforced concrete tunnel between Mt. Elliot and Lenschner avenues, at a cost of $30,000.

Sheldon to Add New Units to Axle Plant

WILKES-BARRE, PA., Feb. 7—Plans for the development of the Sheldon Axle Works, according to George M. Wall, general manager and vice-president, call for the erection early this year of a heat-treating plant for alloy steels and a large extension of the present assembling and shipping departments. Concrete foundations now are being laid for the assembling room extension, on a site, 220 by 100 and 29 by 200 ft., recently acquired from the Lehigh Valley Railroad Co. The structure will be frame, with brick walls extending to the window sills. It will be one story high, and the flooring will be reinforced with concrete. This extension will be completed within two months.

The proposed heat-treating plant will be used for the heat treatment of all alloy steels entering into the manufacture of axles only, which work at present is being done in the spring plant. The building will be built as a matter of large economy, saving much time in transportation.

Kenosha Co. Plans 10,000 Axle Output

KENOSHA, WIS., Feb. 9—The Kenosha Wheel & Axle Co. of Kenosha, Wis., has revised its production schedule for 1920 to embrace a total output of 10,000 axles as the result of business booked at the Chicago show and to accommodate the general demand developed recently. The concern was organized less than a year tgo. It announces that its business derived from the Chicago show exceeds $2,500,000. Martin Winther, a well known motor truck manufacturer of Kenosha, is vice-president.

CASE OPENS NEW BRANCH

RACINE, WIS., Feb. 7—The J. I. Case Plow Works Co., Racine, has opened new quarters in Des Moines at Second and Market streets, with W. A. Bickel in charge. An extensive display of Wallis tractors, Wallis threshers, J. I. Case implements and repairs for each is being arranged for to take care of Iowa trade.

PORTAGE OPENS NEW BRANCH

MILWAUKEE, Feb. 9—Portage Rubber Co. has opened a factory branch at 450 Jackson street, this city, with P. S. Manley, formerly salesman at the Portage Chicago branch, in charge. Six salesmen will work out of the new office.

OIL PIPE CAUSES FIRE

JACKSON, MICH., Feb. 7—Damage to the extent of several hundreds of dollars was sustained by the Frost Gear & Forge Co. this week, when fire started by a bursting oil pipe, spread through the factory building, used for hardening and heat treating. A pyrometer system, used for heat testing, valued at $8,000, was damaged slightly.

Firestone Names New General Salesmanager

AKRON, OHIO, Feb. 9—Firestone Tire & Rubber Co. has promoted E. W. BeSaw, Western salesmanager, to the position of general salesmanager, to succeed A. G. Partridge, who becomes vice-president in charge of sales. L. G. Fairbank becomes vice-president and manager of the Firestone Steel Products Co., and two district chiefs are brought to Akron to take the places of BeSaw and Fairbank. They are F. K. Starbird, of Minneapolis, and J. E. Mayl, whose headquarters has been in Boston. Starbird becomes Western salesmanager, and Mayl takes charge of the Eastern division, as head of the sales organization. BeSaw undertakes the distribution of $150,000,000 worth of tires and equipment in 1920.

New Works Manager of LaFayette Named

INDIANAPOLIS, IND., Feb. 9—D. C. Selheimer, a former member of the Packard organization of Detroit, has been made works manager for the LaFayette Motors Co. Selheimer succeeds Jack Robertson, who has been factory engineer at the LaFayette plant since last June. Robertson formerly was a draftsman with the Cadillac Motor Car Co.

PURCHASING AGENT NAMED

KALAMAZOO, MICH., Feb. 9—Harry L. Dunn, former assistant purchasing agent for the Willys-Overland Co., has been made purchasing agent for the Handley-Knight Co., which will build a six-cylinder Knight car in Kalamazoo. Dunn is well known in the industry, and after leaving the Willys organization he served as assistant general manager of purchases for the Moline Plow Co., working in connection with the Stephens Motor Co., the automobile department of the former organization.

TO EXPAND PLANTS

LANSING, MICH., Feb. 9—The Michigan Securities Commission has approved securities of the Federal Drop Forge Co. and the Lansing Stamping & Tool Co., both of this city. Approval for the Lansing company is for the issuance of $50,000 preferred stock and $150,000 common. The money is to be used to take up some of the indebtedness of the company, and for working capital.

The Federal company proposes to sell its unissued common stock to the amount of $200,000. The company manufactures drop forgings.

WANTS PLANES FOR NAVY

WASHINGTON, Feb. 6—Secretary Daniels has recommended to Congress the construction of three aviation carriers and four destroyer tenders. He proposed that the fabricated steel on hand at Hog Island shipyards be used, thus reducing the cost from $25,000,000 to $11,000,000.

Men of the Industry

Changes in Personnel and Position

John Squires has retired as assistant general manager and chief engineer of the Denby Motor Truck Co. He has made no announcement as to his plans for the future.

M. M. Ames has resigned as sales and advertising manager of the Bukolt Mfg. Co., Stevens Point, Wis., manufacturer of steel sudded tire protectors and other automotive equipment, to accept the position of sales and advertising manager of the Northern Motor & Supply Co., a new jobbing house at Stevens Point.

E. L. Mefford, service manager of the Goodrich Tire & Rubber Co., has been made manager of the Toledo branch. G. R. Litchy will succeed Mefford at the Goodrich plant.

F. N. Hammond has been appointed a special representative of the sales department of the Portage Rubber Co. He was formerly connected with the Goodyear and the Kelly-Springfield companies.

F. R. Humpage has resigned as vice-president and general manager of the Wilt Twist Drill Co., Ltd., of Canada, located at Walkerville, Ont. The resignation is effective March 31.

DRAKE HEADS PARTS CO.

COLUMBUS, Feb. 9 — G. T. Drake heads the Universal Parts Co. of Columbus, chartered with a capital of $60,000. The company will manufacture parts and equipment. The incorporators are I. Yassenoff, H. R. Isaly, J. Nocker, Jr., G. T. Drake and H. J. Martin.

DORT STARTS NEW PLANT

FLINT, Feb. 9—Dort Motor Car Co. has broken ground for a new plant in the eastern suburbs, to include 77 acres, and which when completed will represent an investment of several million dollars. The building plans entered upon will cover a period of about five years. The first unit is expected to be completed and occupied before the end of the present year.

TO BUILD IN CHICAGO

CHICAGO, Feb. 6—Announcement has been made of the plan of the Stromberg Electric Co. to erect a $500,000 plant in this city.

JAPANESE BUSES PAY

WASHINGTON, Feb. 9—Motorbuses in Tokyo have proven to be a paying investment, according to a report received by the Bureau of Foreign and Domestic Commerce.

Louis J. Monahan Dies After Brief Illness

OSHKOSH, WIS., Feb. 9—Louis J. Monahan of Oshkosh, Wis., a widely known designer and inventer, and president of the Universal Motor Co., died from influenza, Feb. 3, after a brief illness. He was a member of the S. A. E. and the American Society of Mechanical Engineers. He was born in Oshkosh, Aug. 9, 1876, and in 1902 founded the Termaat & Monahan Co., to manufacture gasoline engines, mechanical appliances, etc. With his partner he retired in 1913 and formed the Universal Motor Co., which manufactures self-contained generating units for farm lighting, military uses, etc. He also was vice-president of the Universal Foundry Co., Oshkosh.

WICHITA MOTORS EXPANDS

WICHITA FALLS, TEX., Feb. 9—Capital stock of the Wichita Motors Co. has been increased from $800,000 to $1,800,000. All of the new issue has been taken by stockholders in the company. The company was organized in 1910 with capital stock of $160,000, to manufacture the Wichita truck, the first one of which was produced in the early spring of 1911. In 1916 the capital was increased to $400,000, and in 1918 was again increased to $800,000. The company has been under the same management since its inception.

HOT METAL CAUSES FIRE

DETROIT, Feb. 9—Investigation of a fire, which destroyed the frame department of Cadillac Motor Car Co. last week, reveals that it was caused by hot metal. This statement was made by R. H. Collins in refutation of reports of incendiarism. Collins said the company had three similar fires within the last year, all traceable to the same origin. The recent fire caused a loss of $50,000.

BAKER INCREASES STOCK

EVANSVILLE, WIS., Feb. 9—The Baker Mfg. Co. of Evansville, Wis., manufacturer of gas engines and other power farm equipment, has increased its capital stock from $750,000 to $1,600,000 to accommodate the growth of its business and provide for future extensions of the facilities.

AIR CADETS ENROLLED

WASHINGTON, Feb. 10—In line with the recently announced policy of allowing enlisted men to qualify as pilots, the Air Service has placed 194 men on cadet status for instructions at Carlstrom Field, Fla., and March Field, Cal.

At the completion of training the cadets will be commissioned as airplane pilots and given the choice of receiving their discharge or returning to duty as enlisted men with the privilege of wearing wings.

Candidates from civil life who wish to train as airplane pilots will be accepted in the near future, the Air Service announced.

Calendar

SHOWS

Feb. 14-21—New Castle, Pa. Annual Automobile Show, Lawrence County Automobile Trades Assn. J. B. Foster, Manager.

Feb. 14-22—San Antonio, Tex. Automobile Show. San Antonio Automobile Trade Assn. W. A. Williamson, Manager.

Feb. 16-21—Des Moines, Ia. Annual Automobile Show. Des Moines Automobile Dealers' Assn. Ford Factory, Dean Schooler and C. G. Van Vliet, Manager.

Feb. 20 — Cleveland, Cleveland Section S. A. E., Hotel Statler.

Feb. 20-27—New York. National Motor Boat Ship and Engine Show. Grand Central Palace.

Feb. 21-28 — San Francisco. Fourth Annual Automobile Show. Exposition Auditorium. Motor Car Dealers' Assn. G. A. Wahlgreen, Manager.

Feb. 21-28 — Louisville, Ky. Twelfth Annual Exhibition. Louisville Automobile Dealers' Assn. First Regiment Armory.

Feb. 23-27—Reading, Pa. Annual Automobile Show, Reading Automobile Trades Assn., Auditorium. N. S. Jorgenson, Manager.

Feb. 23-28—Elmira, N. Y. Elmira State Armory. Elmira Automobile Club. H. S. Bryan, Manager.

Feb. 23-28—Springfield, Ohio. Annual Automobile Show, Springfield Automobile Trades Assn., Memorial Hall. W. E. Stevens.

Feb. 23-28—Portland, Ore. Truck Show. Armory. Dealers' Motor Car Assn. M. O. Wilkins, Manager.

Feb. 23-28—Portland, Ore. Car Show. Hippodrome Building. Dealers' Motor Car Assn. M. O. Wilkins, Manager.

Feb. 23-28—Grand Rapids, Mich. Motor Car Show. Furniture Exposition Building. M. D. Elgin, Manager.

Feb. 23-28—Duluth, Minn. Automobile Show. Duluth Auto Trades Assn. W. F. Daly, Director.

Feb. 28-March 6—York, Pa. Annual Automobile Show, York County Dealers' Assn., Overland - Harrisburg Garage. R. A. Anderson, Manager.

Mar. 1-6—Springfield, Mass. Annual Automobile Show. Auditorium. Springfield Automotive Dealers' Assn. Robert H. Clark, Manager.

Mar. 1-6—St. Joseph, Mo. Annual Automobile Show. St. Joseph Automobile Show Assn. Auditorium. John Albus, Manager.

Mar. 1-6—Grand Rapids, Mich. Truck Show. Furniture Exposition Bldg. M. D. Elgin. Manager.

Mar. 1-7—Springfield, Mass. Annual Automobile Show. Springfield Automobile Dealers' Assn. Harry Stacy, Secretary.

Mar. 1-8—Seattle. State Armory. Motor Car Dealers' Assn. William J. Coyle, Manager.

Mar. 2-6—Springfield, Ill. Annual Automobile Show. Springfield Auto Dealers' Assn. John Brodhead, Manager.

March 3-6—Clinton, Ia. Annual Automobile Show. Clinton County Automobile Dealers' Assn., Coliseum. Harry G. Finch. Manager.

March 6-13—New York, N. Y. Second Annual Aeronautical Exposition, Manufacturers' Aircraft Assn., Inc., 71st Regiment Armory. Walter Hempel, Manager.

Mar. 6-13 — Greenville, S. C. Carolina Automobile Show. Greenville Dealers' Assn. Textile Hall.

Mar. 7-13—Muskegon, Mich. Automobile Show, Muskegon Auto Business Men's Assn. J. C. Fowler, Manager.

Mar. 8-13—Indianapolis, Ind. Annual Automobile Show, Indianapolis Auto Trade Assn. Manufacturers' Bldg. State Fair Grounds. John B. Orman, Manager.

Mar. 10-13—Lebanon, Pa. Annual Motor Show. Automotive Trade Association of Lebanon. James Furniture Store-Bldg. J. Paul Enck, Manager.

Mar. 12-20—Boston, Mass. Annual Automobile Show. Mechanics' Building.

Mar. 15-20—Great Falls, Mont. Automobile Show. Montana Automobile Distributors' Association.

Mar. 20-27—Trenton, N. J. Annual Automobile Show. Armory. Trenton Automobile Dealers' Assn. John L. Brock, Manager.

March 20-27—Pittsburgh. Motor Square Garden. Automotive Association, Inc. John J. Bell, Manager.

Mar. 22-27 — Oklahoma City, Okla. Annual Automobile Show. Oklahoma City Motor Car Dealers' Assn. G. W. Woods, Manager.

FOREIGN SHOWS

Feb. 22-28—Ottawa, Ontario. Motor Show.

Feb. 22-March 6—Birmingham, England. British Industries Fair.

March—London, England. Motor Boat Marine and Stationary Engine Exhibition.

March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.

April or May—London, England. Commercial Vehicle Exhibition. Olympia.

April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.

July—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.

TRACTOR SHOWS

Feb. 16-21—Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy S. Hall, Manager.

CONTESTS

August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.

June, 1920—Omaha, Neb. Reliability Truck Tour.

CONVENTIONS

May 13-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

S. A. E. MEETINGS

Feb. 19 — Kansas City, Mo. Tractor Dinner. Hotel Baltimore.

Feb. 20—Indiana Section. Hotel Claypole, Indianapolis. Speaker W. R. Shimer. Subject: "Steel in the Automotive Industries."

Feb. 20—Cleveland Section Meeting, Hotel Statler. Subject: "Commercial Possibilities of the Airplane."

Feb. 25—Motor Boat Meeting. S. A. E. Headquarters, New York. (Evening Session.)

Feb. 27—Midwest Section, Chicago.

Mar. 10—Aeronautic Dinner and Meeting. S. A. E. Headquarters, New York.

Louisville Bus System to Operate March 1

LOUISVILLE, Feb. 9—An auxiliary transportation system may be put into operation in Louisville on March 1, when, according to statements of promoters, the Kentucky Automobile Transportation Service Company expects to start operations with forty-four automobile buses capable of hauling fifty persons each. Articles of incorporation for the company were to be filed to-day. Judge J. E. Sampson, Harlan, represents the company, which has $150,000 capitalization.

J. L. Bierach, Louisville, who will be vice-president and treasurer of the company, says that the purpose is not to fight the Louisville Railway company, but to form a permanent corporation to give a needed service here. He also said that a survey showed that a fair return would be yielded by a 5-cent fare.

The new auto buses plan to issue transfers on the 5-cent charge, and will carry only white passengers. It is planned to have 100 of the buses operating on a number of lines by fall. The company says it can operate as a private corporation without a city franchise. For protection it will carry liability insurance. The first routes to be opened, it is said, will be from Crescent Hill to Portland and from Shawnee Park to Bardstown Road, and ultimately all buses will "loop" in the business district. It is planned to use double-deck equipment in summer.

INCREASE TIRE CO. STOCK

PHILADELPHIA, Feb. 6—The capital stock of the Diamond Holdfast Rubber Co. has been increased to $2,500,000 to provide for the establishment of a factory at Atlanta, Ga.

KELLY TIRE BUYS SITE

NEW HAVEN, CONN., Feb. 6 — The Kelley Tire & Rubber Co. has secured a site in West Haven for a proposed new plant to cost $650,000.

Ohio Issues Licenses Under Graduate Act

COLUMBUS, OHIO, Feb. 9—Secretary of State Smith announces that 1920 automobile tags will be sold to any motorists desiring them after Feb. 5. This action was taken to permit owners to tour outside of the state and in Canada, where the 1919 tags, which have been in use since the first of the year, are not recognized. The reason for the delay in distributing 1920 tags is the attack on the newly enacted graduated automobile license law.

The attorneys representing the Ohio Automobile Association, which is making the fight on the law, have appealed the case into the Court of Appeals after an unfavorable decision in the Court of Common Pleas. The State Treasurer announces that purchasers of the 1920 tags at the higher figures must take a chance of refund from the State Treasury in case the law is finally held unconstitutional.